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ABSTRACT

This study examined a social-organizational hypothesis that explains how silent reading in small-group lessons might influence students' learning. One hundred children in four third-grade classes, each divided into three ability groups, received two silent and two oral reading lessons. Group dynamics were measured from videotapes of the lessons. Students' learning was measured from story recall and passage and word reading. Results showed that positive effects of silent reading were mediated by student attention and teacher-student discussion; students were more attentive during silent reading than they were during oral reading and they reinstated more story information in discussion. However, there was no net benefit of silent reading on learning. The reason was the blank, unproductive time when students had to wait for others to finish reading before discussion could resume. This slowed the pace of the lessons and seemed to offset benefits accruing from attention and discussion. These results are consistent with the social-organizational hypothesis that positive effects of silent reading are socially constructed. Benefits of silent reading may be realized only if teachers organize their lessons to make best use of available time and adapt their instruction to capitalize on students' increased attention during silent reading and their responsiveness to story content during discussion. (Seven figures and 24 tables of data are included; 97 references are attached.) (Author)

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Abstract

This study examines a social-organizational hypothesis that explains how silent reading in small-group lessons might influence students' learning. One hundred children in four third-grade classes, each divided into three ability groups, received two silent and two oral reading lessons. Group dynamics were measured from videotapes of the lessons. Students' learning was measured from story recall and passage and word reading. Results showed that positive effects of silent reading were mediated by student attention and teacher-student discussion; students were more attentive during silent reading than they were during oral reading and they reinstated more story information in discussion. However, there was no net benefit of silent reading on learning. The reason was the blank, unproductive time when students had to wait for others to finish reading before discussion could resume. This slowed the pace of the lessons and seemed to offset benefits accruing from attention and discussion. These results are consistent with the social-organizational hypothesis that positive effects of silent reading are socially constructed. Benefits of silent reading may be realized only if teachers organize their lessons to make best use of available time and adapt their instruction to capitalize on students' increased attention during silent reading and their responsiveness to story content during discussion.

MICRO-EXPERIMENTAL ANALYSIS OF THE SMALL-GROUP READING LESSON: SOCIAL AND COGNITIVE CONSEQUENCES OF SILENT READING

The small-group reading lesson is pervasive in elementary schools throughout the United States. Austin and Morrison (1963) were among the first to document the widespread use of small-group lessons, reporting that in almost all of the school systems they studied, small-group instruction for reading was the predominant practice. More recently, Goodlad (1984) noted the pervasiveness of such lessons in primary-grade classes, and data from the 1988 National Assessment of Educational Progress (Langer, Applebee, Mullis, & Foertsch, 1990) showed that approximately 79% of fourth-grade students were taught using reading groups. In the last few years, with the trend toward more unified language arts curricula, use of small-groups for reading instruction may have declined, but there is evidence that small-group lessons are still prevalent (Barr & Dreeben, 1991).

Despite the pervasiveness and staying power of the small-group reading lesson in American schools, there has been little research into the cognitive consequences of features of the lesson. There has been much naturalistic research describing the social participation and instruction found in groups of different ability (e.g., Allington, 1983; Hiebert, 1983). However, there has been little research documenting the consequences of participation and instruction for learning.

The present study is one step in a program of research that seeks a comprehensive understanding of the small-group reading lesson in elementary school classrooms (Anderson, Wilkinson, & Mason, 1991; Anderson, Wilkinson, Mason, Shirey, & Wilson, 1988; Chinn, Waggoner, Anderson, Schommer, & Wilkinson, in press; Imai, Anderson, Wilkinson, & Yi, 1992). The purpose of the research is to determine the factors that converge at a moment to determine whether information being covered in a small-group lesson will be comprehended, learned, and later remembered. We investigate the page-by-page and even proposition-by-proposition transactions during the lesson and how these relate to children's comprehension and fluency on the story covered. We experimentally manipulate features of the lesson to assess their influence independent of students' abilities. And, following a recommendation of Hallinan (1984), we construct multivariate models describing how lesson features interact with student characteristics, group characteristics, and story characteristics to influence learning.

The purpose of the study was to examine the social and cognitive consequences of silent reading, as opposed to oral reading, in small-group lessons. The intent was to examine a social-organizational hypothesis (cf. Au & Mason, 1981) that suggests that any positive effects of silent reading may not be found solely in direct cognitive consequences for individual students but in the dynamics of the reading group during teacher-directed instruction.

Teachers' allocation of time to silent and oral reading in small-group lessons is of considerable educational significance. Surveys and observations of classroom practices show that schools place most emphasis on oral reading in the primary grades (Allington, 1984a; Austin & Morrison, 1963; Kurth & Kurth, 1987; Mason & Osborn, 1982), especially for instruction with poor readers (Allington, 1980; Gumperz & Hernandez-Chavez, 1972; Hale & Edwards, 1981; Howlett & Weintraub, 1979; McDermott & Aron, 1978; Quirk, Trismen, Nalin, & Weinberg, 1975). The emphasis shifts somewhat to silent reading in the middle and upper grades but, even at this level, most schools continue to devote a considerable amount of time to oral reading (see Allington, 1984a). By contrast, silent reading is a feature of small-group lessons in several exemplary reading programs: the Kamehameha Early Education Program in Hawaii (Au, 1981), a program at Benchmark School in Media, Pennsylvania (Gaskins & Elliot, 1991), and reading instruction in New Zealand schools (Elley, 1985). The present study provides the first direct evidence of its effects.

Two strands of research provide the rationale for the social-organizational hypothesis examined in the present study. The first is research on the relative effects of silent and oral reading on children's learning. Although there is no direct evidence of the effects of silent reading in small-group lessons, three lines of inquiry provide indirect evidence of the possible effects. The second is research on grouping for reading instruction, which provides evidence of the powerful influence of social-organizational factors in learning to read.

Research on Silent and Oral Reading

One line of inquiry on the relative effects of silent and oral reading comes from experimental studies of text comprehension. These are short-term studies comparing subjects' comprehension of text following the different types of reading. The conventional wisdom is that silent reading encourages an emphasis on meaning rather than on surface-level features of text and hence facilitates a deeper, more elaborate processing of the text (cf. Craik & Lockhart, 1972; see Durkin, 1981). However, results have been equivocal. Some studies report a significant comprehension advantage for silent reading (e.g., Mead, 1915), others report a significant advantage for oral reading (e.g., Elgart, 1978). Still others report no significant differences in comprehension following silent and oral reading (e.g., Gray, 1956). In a meta-analysis of these studies, Wilkinson, Anderson, and Pearson (1988) showed that silent reading may have cognitive benefits for individual students, but that effects are very small--in the order of .2 or .3 of a standard deviation in terms of population parameters--and very sensitive to the influence of other factors. Effects of silent reading varied primarily as a function of grade level and the advantage for comprehension began to show beyond grade three. Effects were conditioned by the ability of the reader, difficulty of the text, and type of comprehension tested.

Another line of inquiry comes from correlational studies of the relationship between classroom practices and students' reading achievement. These are large-scale studies, usually with "disadvantaged" populations, which capitalize on existing variation in classroom practices to correlate time spent reading silently or orally (among other measures of classroom processes) with end-of-year achievement. The conclusion from the correlational studies is that silent reading is not associated with achievement for low ability readers (Leinhardt, Zigmond, & Cooley, 1981; Stallings, 1980; Wilkinson, Wardrop, & Anderson, 1988). For low ability readers, oral reading may be more beneficial, presumably because it places greater demands for participation and promotes teacher feedback in response to errors (cf. Hoffman, 1981). Only one study, an analysis of data from Meyer, Linn, and Hastings' (1985) longitudinal study of reading comprehension development (unpublished), showed any benefits of silent reading.

A third line of inquiry comes from microanalyses of reading during small-group lessons. These provide relatively finegrained analyses of group dynamics or patterns of teacher-student interaction during small-group lessons. Based on these studies, three factors specific to the small-group setting can be identified that might covary with silent (or oral) reading conducted by the teacher and differentially influence learning. Much of this work involves analysis of oral reading lessons. Hence, effects of silent reading have to be inferred by way of contrast with oral reading.

The first factor is *pacing*. Silent reading is more efficient than oral reading--that is, more words are read per minute--even for students in the primary grades (Harris & Sipay, 1985). In small-group lessons, therefore, silent reading should permit a faster pace (Allington, 1980, 1983) and hence contribute to greater gains in reading achievement (Barr, 1973-74, 1975). At face value, pacing would seem to have little to do with group dynamics. However, although the underlying mechanism by which pacing leads to achievement is not clear, presumably the explanation lies in some aspect of group process (cf. Barr & Dreeben, 1983). Pacing might also have concomitant effects on group discussion in that time not needed for reading may be time teachers and students can use to engage in more fulsome discussion of the story.

The second factor is *student attention* during the lesson. Silent reading lessons may foster greater attention because all students can be directly engaged in reading. By contrast, the turn-allocation routine of oral reading lessons allows only one child at a time to be actively engaged, whereas the other students are required to "maintain interest in an activity they cannot participate in directly" (Eder, 1982b, p. 155). As well, studies show that errors made by oral readers foster teacher interruptions and student call-outs to correct the error (Eder, 1982b; Heap, 1980). According to Allington (1977, 1980, 1983), the interruptions and call-outs disrupt the continuity of the lesson, draw attention away from the story, and increase off-task behavior. Moreover, effects may be cyclical. There is some evidence to suggest that teachers' attempts to correct errors cause fewer words to be read (Niles, Winstead, & Graham, 1977) and serve only to increase error rates (McGill-Franzen & McDermott, 1978; see also, Pehrsson, 1974). Likewise, attempts to control call-outs may increase students' off-task behavior (Eder, 1982b).

The third factor is the *emphasis on story meaning*. There is the claim that silent reading encourages an emphasis on meaning rather than on decoding or word accuracy. Durkin (1981) is a major proponent here, though similar claims have been made by Hale and Edwards (1981) and Heap (1980). Essentially, the argument is that silent or oral reading influences the beginning reader's perception or tacit theory of what constitutes "reading." In Durkin's (1981) words: "persistent attention [to oral reading] may encourage children to conclude that reading is a performing art, not a thought-getting process" (p. 542). The underlying mechanism by which this effect may occur is not clear. No doubt, frequent interruptions to correct oral reading errors reinforce norms of reading as a "performing art." Additionally, different evaluative criteria used in silent and oral reading lessons might produce different norms governing successful performance (cf. Heap, 1980). As Allington (1983) points out, the adequacy of silent reading is often judged on the basis of students' responses to postreading comprehension questions--performance norms emphasizing story meaning, whereas the adequacy of an oral reading performance is often judged on accuracy of students' verbalizations of text--norms stressing "saying the words right."

Research on Grouping

One of the more interesting findings from research on grouping is the effect of group membership. When predicting students' learning outcomes following participation in group lessons, researchers often find that measures reflecting group membership, such as mean or nominal ability level of groups, add significantly to the prediction even after measures of individual characteristics of the students have been taken into account (Anderson et al., 1991; Barr & Dreeben, 1983; Juel, 1990; Weinstein, 1976). It seems that the group measures contain something more than or different from the individual measures.

There are several, probably overlapping, explanations for this finding. The first and most plausible is the differential treatment explanation. The group measures may reflect differentially effective instructional practices that teachers use with high and low ability groups. For example, research shows that teachers employ a faster pace, more probing questions, or otherwise more demanding level of instruction with high groups (Allington, 1984a; Barr & Dreeben, 1983; Hiebert, 1983). The group measures may be picking up the impact of these practices either at the time the study was conducted or over the lifetime of the reading group.

The second explanation is that group measures reflect differences in group culture or norms of teacher and student behavior in small-group lessons. For example, high groups appear to have norms that support paying attention, and teachers and children in these groups tolerate fewer interruptions and call-outs that disrupt the lessons (Eder & Felmlee, 1984; Hiebert, 1983; Imai et al., 1992). As with instructional practices, group measures may be picking up the influence of group culture either at the time of the study or over the lifetime of the group.

A rival explanation attributes the group effect to differences in the traits of the children who belong to the groups. The argument is as follows: If there seems to be an effect of group membership beyond children's individual reading levels, it is an artifact arising because the measure of individual reading

level is not completely valid or reliable. Teachers have available to them a greater breadth and depth of knowledge about children's abilities than can be represented on a single test. When they compose the groups, they correct for errors of measurement in individual ability based on their extensive experience with the children's class performance. Hence, the group measure may reflect additional information about children's traits, beyond that contained in the individual measure (Anderson et al., 1988). One variant of this is that the group measures reflect cognitive traits such as reading aptitude. Another is that they reflect non-cognitive traits such as differences in children's motivation and cooperation.

Research on grouping has reached no decisive verdict on the explanation for the group effect. Investigators have shown a distinct preference for explaining the effect in terms of differences in instructional practices or norms of behavior, although they have not seriously considered the idea that group measures could reflect additional information about children's traits. In our own research, we have attempted to take into account differences in validity and reliability of measurement and, to date, our results favor the explanation that group measures reflect differences in norms for paying attention (Imai et al., 1992).

Present Study

Taken together, research on silent and oral reading and research on grouping can be used to advance a social-organizational hypothesis to explain how silent reading might operate in the small-group lesson to influence growth in students' reading ability. To review, experiments examining the effects on text comprehension show that silent reading may have positive effects, but the effects are small and highly sensitive to the ability of the reader, the difficulty of the text, and the nature of the comprehension task. Hence, if effects at the intra-individual level are as variable as the results indicate, then it is not unreasonable to suppose that they may be equally susceptible to factors associated with instructional environment. Correlational studies of classroom processes attest to the influence of these variables; the studies demonstrate that while silent reading could have long-term positive effects, presumably other inter-individual factors are important in the classroom context. The microanalyses of small-group reading lessons help identify those candidate factors likely to mediate or moderate the effects of silent reading in the small-group lesson--namely, pacing, attention, and emphasis on story meaning. Finally, the research on grouping lends credibility to the notion that social-organizational factors may have a powerful influence on students who are learning to read.

Therefore, evidence from both strands of research suggests that positive effects of silent reading may not be found solely in direct cognitive consequences for individual students but in the social-organization of the reading group at the inter-individual level. In other words, instead of being individually constructed, beneficial effects of silent reading might be socially constructed. The present study was designed to test this hypothesis.

Note that our theoretical premise is neo-Vygotskian: Underlying our hypothesis is a fundamental belief in the social origin of individual mental processes (Au & Kawakami, 1984; Bruner, 1985; Cazden, 1988; Forman & Cazden, 1985; Wertsch, 1985). We subscribe to the notion that conditions in small-group lessons take on special theoretical significance for permitting inter-individual functioning to influence intra-individual functioning and student learning.

To recapitulate, the purpose of the present study was to test a social-organizational hypothesis concerning the way silent reading in small-group lessons operates to influence students' learning. The principal test of the social-organizational hypothesis was whether group processes of pacing, student attention, and emphasis on story meaning could be placed on the causal path between silent reading and students' learning. This entails three questions: (a) does type of lesson affect group processes; (b) does type of lesson affect learning; and (c) what role do group processes play in contributing to learning.

In addition to examining the effect of type of lesson on group processes and student learning, also studied but not manipulated were three other classes of variables: student characteristics, including gender, ethnicity, socioeconomic status, reading fluency, and reading comprehension level; group characteristics, including group size, average comprehension and fluency, heterogeneity of comprehension and fluency; and story characteristics, including readability and importance of information on the page, and serial position of the page.

Method

Subjects

One hundred children in four third-grade classes (including one combination second-third grade class) from two schools participated in the study. One school was located in a working-class neighborhood and the other in a middle-class neighborhood of a midwestern industrial city. Fifty-two of the children were girls, 37 were of minority background, and 47 were eligible for free or reduced lunch. A standardized reading comprehension test, administered by the school district in the previous year, showed the children had an average stanine of 5.6 with a standard deviation of 1.5, which compares with a national average of 5 and standard deviation of 2.

The classes were heterogeneous in ability. All but one teacher grouped for reading instruction into three within-class ability groups. The other used two groups but divided her class into three for the study. All teachers used the Ginn 720 basal reading program and regularly used both silent and oral reading in their small-group lessons.

Materials

Four stories were selected from the Economy *Keys to Reading* program (Harris, Creekmore, Matteoni, & Allen, 1975). "Flower Street" and "Instant Watermelon" were from the 2-2 reader and had a Fry readability score at the early third-grade level. "Lisa's Song" and "Any Old Junk" were from the 3-1 reader and had a Fry readability score at the middle third-grade level. Each story was adapted so that it could be covered in one lesson, and each was divided into 12 pages and six reading units. A reading unit typically contained two pages and presented a relatively complete event or episode from the story. The stories ranged in length from 585 to 599 words.

Two teacher's manuals were constructed for each story, one for silent reading lessons and one for oral reading lessons. Essentially, teachers were instructed to conduct lessons according to the usual guidelines for the directed reading activity (Betts, 1946) and to use their "best professional judgment" as to how to conduct the lessons in order for children to get the most benefit. There was to be no preteaching of vocabulary. After each reading unit, teachers were instructed to ask at least one question per page: "These may be questions about word analysis, word meaning, story content, the children's own experiences--whatever you decide." The only indication as to our interest in the lessons was: "We are interested in the overall style in which you conduct the lessons and how you change the style to accommodate the different lesson format."

Five tests were used to measure reading aptitude. These were: the comprehension subtest from the 1985 edition of the SRA Achievement Series, the comprehension subtest from the Illinois Goal Assessment Program (IGAP) (Valencia, Pearson, Reeve, & Shanahan, 1988), teachers' ratings of comprehension on a 6-point Likert scale, time to read two passages from the Gray Oral Reading Tests-Revised (Weiderholt & Bryant, 1986), and time to pronounce two lists of pseudo-words adapted from Stanhope and Parkin (1987) and Stanovich, Cunningham, and Feeman (1984).

Design and Procedure

The study employed the within-class design shown in Table 1. Each group was taught two silent reading lessons and two oral reading lessons. Type of lesson was counterbalanced for lesson order and stories. Stories were assigned to treatments in pairs such that, in any one condition, "Instant Watermelon" and "Lisa's Song" were always paired and "Flower Street" and "Any Old Junk" were always paired. In this way, stories were further equated in difficulty and differential interest to boys and girls. Within each class, stories were assigned to groups such that on any one day no two groups received the same story. This was necessary in order to minimize carry-over effects, especially in the oral reading condition. The basic building-block design was a randomized block 2 (lesson type) x 2 (story pair) factorial with group-interaction confounding but where blocks comprised a sample of groups rather than vice versa (Kirk, 1982). The Lesson Type x Story Pair interaction was confounded with blocks because the interaction was assumed to be negligible and there was little substantive interest in this interaction.

[Insert Table 1 about here.]

The study ran for six weeks in each school. It was conducted in the fall in the middle-class school and in the spring in the working-class school. In each class, the stories were featured in lessons taught on two days in the third week and two days in the sixth week. Typically, in these weeks, lessons were taught on Monday and Wednesday in one class and Tuesday and Thursday in the other, with Friday reserved for testing.

The two to three weeks prior to each pair of test lessons was a "socialization period." During this time, teachers conducted reading groups with their Ginn 720 materials using either all silent reading or all oral reading, depending on treatment. The purpose of this period was to allow time for appropriate group norms governing teacher and student behavior in the two conditions to take hold. Guidelines for the lessons during this period were similar to those in the teacher's manuals for the study in order to ensure that teachers and students would be familiar with the procedures.

Teachers were given the teacher's manuals one week before the lessons were to be conducted. The manuals were collected at the end of each study week. All lessons were videotaped. Instructions for silent reading lessons were:

> We would like you to conduct this lesson as a guided <u>silent reading</u> lesson. Children, as a group, are to read silently each reading unit of the selection. Hence, you may still follow the basic sequence of the guided reading lesson--preparation for reading, guided reading, and discussing the selection--but in the "guided reading" phase of the lesson please always direct the children to read silently. Instruct the children that when they complete a reading unit, they may reread the unit or they should turn over their booklets and wait for the other children who are still reading. However, always encourage them to refer to their booklets when discussing what they have read.

Instructions for oral reading lessons were:

> We would like you to conduct this lesson as a guided <u>oral reading</u> lesson. Children are to take turns reading aloud each page of the selection. This means that when one child is reading aloud, you should have the other children follow along in their booklets reading silently. Hence, you may still follow the basic sequence of the guided reading lesson--preparation for reading, guided reading, and discussing the selection--but in the "guided reading" phase of the lesson please direct one child at a time to read aloud. Assign oral reading turns for each page of the selection, and please do this in an ordered or systematic fashion so that children know when it will be their turn to read aloud.

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Following the lesson, children were taken out of the classroom in random order by one of five research assistants. The assistant asked the child to retell the story, then to reread a passage from the story, then to complete one other task. This task was: Day 1, pseudo-word list 1; Day 2, Gray Oral Reading Tests-Revised passage 1; Day 3, pseudo-word list 2; Day 4, Gray Oral Reading Tests-Revised passage 2. For the retelling, children were asked to retell each story into a tape recorder "so that a second grader who has not read the story will be able to understand it--even the hard parts" (cf. Fielding, 1989). For the rereading, children were asked to reread a relatively difficult passage from each story, 189-210 words in length, from which oral reading errors and time in hundredths of a second were noted.

On the last day of the week, children were asked to read a list of 15 words from the pair of stories just covered. They were asked to read "as quickly as you can" and to "try to read each word correctly." Time was recorded in hundredths of a second.

Scoring

Dependent measures. Recalls were transcribed and scored using a simplified version of the case grammatical scheme employed by Goetz, Anderson and Schallert (1981). Several adults parsed the stories into concepts and propositions, where a concept was approximately equal to a content word and a proposition was approximately equal to an independent clause. Two adult scorers, who were blind to the treatment, then scored the recalls. A concept was scored correct if the gist was reproduced, which meant that the subject could substitute an approximate synonym. A proposition was scored correct if enough of the concepts were recalled in appropriate order to express the main idea. The measure was the percentage of propositions on a page that were recalled. Interscorer reliability was .90 (Pearson product-moment correlation).

Normative ratings of the importance of each proposition were also obtained. Twenty graduate students rated each proposition in terms of its importance to the overall theme or plot of the story on a four-point scale (1 = *not at all important*, 4 = *very important*) (cf. Freebody & Anderson, 1986; Johnson, 1970). The importance of each proposition was determined by averaging the ratings and performing a median split on means within each story; those propositions above the median were considered *important* and those at or below the median, *unimportant*. The measure of important propositions recalled was the percentage of important propositions in a story that were recalled.

Rereadings of passages from the stories were transcribed and oral reading errors coded following procedures of Goodman, Watson, and Burke (1987). Reading rate was expressed in words per minute. Two adults classified the errors into acceptable and unacceptable errors (cf. Beebe, 1980; Herman, 1985). Acceptable errors included self-corrections and any substitutions, omissions, insertions, or reversals that were syntactically and semantically congruent with the sentence and with the prior portion of the passage. Unacceptable errors included all remaining errors. Repeated errors and dialect variations were not counted as errors. The measures obtained were the percentage of words read on which an error was made, reflecting overall reading accuracy, and the percentage of errors that were acceptable, reflecting "quality" errors indicative of comprehension. Interscorer reliability was .90 for percentage of errors and .89 for percentage of errors that were acceptable (Pearson product-moment correlations).

Process measures. Pacing was measured in terms of teachers' use of time. *Lesson time* was the time from the start of the teacher's opening statement pertaining to the story to the end of the teacher's closing statement pertaining to the story. *Reading time* was the time children spent reading each page. It differed from child to child for silent reading lessons, but was fixed for oral reading lessons because time per page was determined by the speed of the oral reader. It included time taken for teacher and student interruptions and teacher feedback. Also noted during silent reading lessons was *waiting time*; the time children had to wait for others to finish reading before discussion could resume. *Page-by-page discussion time* was the time from the start of the teacher's directive to read the first page to the end

of discussion of the last page, less reading time and waiting time. *Pre- and post-reading discussion time* was the time spent introducing the story and concluding the lesson. Both discussion measures included time spent in teacher management and assignment of reading.

Student attention was measured in terms of the time children attended to relevant parts of the lesson during reading. Relevant parts of a lesson were determined by whatever the teacher made normative. Hence, attention was defined as looking at the appropriate page(s) of the story or looking at the teacher if she was speaking to the group, without engaging in contact with other children that was not directly related to the story being read (cf. Eder, 1982a). Inattention was defined as all other behavior during reading. Special cases arose when errors, including pauses, made by the oral reader caused a child to look up from his booklet. As a rule, if the child was trying to correct the error or was attending to the teacher, the oral reader, or other group members who may correct the error, then this behavior was coded as attention.

Three adults scored attention with the aid of a computer program. The scorer followed one student at a time on the videotape, pressing a key on a computer terminal whenever the student shifted from a state of attention to a state of inattention, or vice versa. The program calculated the duration of each state and also compiled the data base, keeping track of the student, the story, the page, and so forth. The measure was the percentage of time per page spent in a state of attention. Interscorer reliabilities were .98 for silent reading lessons and .99 for oral reading lessons (Pearson product-moment correlations).

Emphasis on story meaning was measured in terms of the degree to which propositions in the stories were reinstated in discussion. The analysis was modelled on that pioneered by Au and Mason (1981) and elaborated by Omanson, Beck, Voss, and McKeown (1984) and Harker (1989). The assumption underlying the analysis was that, in addition to the text itself influencing comprehension, discussion during the lesson serves as an extended text and also influences comprehension. Each reinstatement of a proposition was assumed to provide further opportunity for the child to process text information and increase the probability of recall.

Two adults transcribed the lessons and another two scored the transcripts for contacts with propositions from the stories. Scoring was for gist and followed the same procedures used in scoring recall. To assess both the teacher's and students' contributions to discussion, separate counts were made of teacher's contacts with concepts and children's contacts with concepts. However, both teacher and children were assumed to contribute jointly to contact with propositions. The measures were the percentage of concepts on a page reinstated by the teacher, the percentage of concepts on a page reinstated by the children, and the percentage of propositions on a page reinstated in discussion overall. Interscorer reliabilities for these measures were .94, .96, and .88, respectively (Pearson product-moment correlations).

A measure was also obtained of the percentage of important propositions in a story that were reinstated in discussion, using the normed ratings of importance of each proposition described earlier.

Scorers also kept separate counts of the number of background knowledge question-answer episodes and the number of inference episodes. Interscorer reliabilities for these measures were .97 and .96, respectively (Pearson product-moment correlations).

Overview of Analysis

Table 2 presents descriptive information about independent variables in the analysis. The comprehension and fluency variables were estimated factor scores based on measures of students' reading aptitude. Comprehension measures were scaled scores from the comprehension subtest of the SRA Achievement Series; scaled scores from the comprehension subtest of the IGAP, expressed as

proportions of the total possible score and measured in radians following an arcsine transformation [2 arcsine $\sqrt{p}$]; and teacher ratings of comprehension. Fluency measures were time in hundredths of a second to read the two passages from the Gray Oral Reading Tests-Revised; and time in hundredths of a second to pronounce the two lists of pseudo-words. Passage times were averaged and normalized by taking the natural log, and the scale was inverted. Pseudo-word times were averaged and normalized by taking the reciprocal.

[Insert Table 2 about here.]

Missing data on the five measures were estimated using ordinary least squares regression. A two-factor model was then fit to correlations among the five measures, yielding a χ^2 of 5.67 (df = 5, p = .34, *RMSR* = .04). The comprehension factor was indexed by the SRA, IGAP, and teacher ratings and had loadings of .84, .74. and .78, respectively. The fluency factor was indexed by passage time and pseudo-word time and had loadings of .95 and .79, respectively. The fit was significantly better than that of a one-factor model (difference χ^2 = 53.22, df = 1, p < .01). Estimated factor scores for comprehension and fluency were computed by the regression method and converted to local stanines. The factor scores were normally distributed and had a correlation of .75.

For the most part, data were analyzed using the general linear model approach to analysis of repeated measures designs. Models were explored in separate between-subjects and within-subjects regressions, following procedures of Cohen and Cohen (1983). Final models were fit in one regression, following procedures of Pedhazur (1982) and Lorch and Myers (1990). The programs used were SPSS^x Regression (SPSS, 1988) and SAS GLM (SAS Institute, 1985).

All main effects and first-order interactions were tested, except interactions among child or group characteristics and those among text properties. No higher order interactions were tested, because there was no theory to guide selection of higher order terms. Presented are the reduced models that were compiled by deleting nonsignificant factors from the corresponding full models and rerunning the programs. Nonsignificant treatment effects were included in reduced models, for purposes of discussion. Nonsignificant main effects were also included if they entered into significant interactions. The nominal alpha was .01.

Analysis of the way group processes contributed to learning was performed by path analysis of the relations among type of lesson, group processes, and learning. Path models tested the hypothesis that type of lesson (contrast coded: 1 = silent reading, -1 = oral reading) had both direct and indirect effects on learning, the latter being mediated by group processes. Variation due to story and page properties was removed by entering three dummy variables for stories, 11 dummy variables for pages, and 33 variables for the interaction of story and page properties for a total of 47 degrees of freedom. In addition, because the analyses were entirely within-subjects, variation due to subjects was removed by entering a vector of N-1 dummy variables into each equation. The nominal alpha was again .01.

Analyses of time use and discussion were carried out with the reading group as the unit of analysis. Analyses of attention and learning were carried out with the student as the unit of analysis. In the latter case, there is the worry that it may not be appropriate to count individual children in a group as contributing independent observations (Burstein, 1980; Raudenbush & Bryk, 1988). Estimated standard errors may be biased downward, and tests of significance may be too liberal. To address this concern, we carried out a parallel set of analyses in which the reading group, rather than the student, was the unit of analysis. There was some loss of sensitivity in these analyses because of the reduction in degrees of freedom. In almost every case, however, results agreed with those from the student-level analyses. In only one instance was there a change that might influence our interpretation of the results, and this is reported below.

Furthermore, in some analyses, the unit of measurement was performance on a complete story. In others, the unit of measurement was performance on a page within a story. The exact level of analysis and unit of measurement are noted in the description of the results.

Group Dynamics

Time Use

Means and standard deviations of measures of time use by type of lesson, for each class, are presented in Table 3. The unit of analysis was the performance of a reading group on a story (i.e., a lesson). There were 24 silent reading lessons and 24 oral reading lessons. For the analysis, all variables except lesson time were normalized by taking natural logs.

[Insert Table 3 about here.]

Table 4 summarizes the analysis of lesson time. Results showed that silent reading lessons took significantly longer than oral reading lessons. In addition, group fluency had a significant influence on lesson time; the higher the fluency of the group, the shorter the lessons.

[Insert Table 4 about here.]

Table 5 summarizes the analysis of reading time per lesson. Silent reading time was significantly shorter than oral reading time. There was a possible interaction between lesson type and group fluency, such that the advantage for silent reading was greater when average fluency of the group was low, although this failed to reach significance ($F(1,31) = 5.92, p = .021$). Table 6 summarizes an alternate analysis in which we added waiting time to reading time and analyzed the composite variable, elapsed time. This showed that children in fact took longer to finish reading a story in silent reading lessons than they did in oral reading lessons. In both cases, there was a significant effect due to the particular content and form of the stories. Group fluency was again significant; the higher the fluency of the group, the shorter were both reading time and elapsed time.

[Insert Tables 5 and 6 about here.]

Table 7 summarizes the analysis of page-by-page discussion time per lesson. This was greater in silent reading lessons than in oral reading lessons, although the difference did not quite reach significance ($p = .012$). Average comprehension level of a group had a significant influence on page-by-page discussion time; the higher the comprehension level, the less time was spent discussing the story.

[Insert Table 7 about here.]

The analysis of pre- and postreading discussion time showed no effect of treatment ($F(1,32) = .92, p > .01$), and no other effects were significant.

Student Attention

Means and standard deviations of percentage of time attended by type of lesson, for each class, are presented in Table 8. The unit of analysis was the percentage of time attended by an individual child on a page of a story. For the analysis, percentage of time attended was measured in logits [ln(p/(1-p))/2].

[Insert Table 8 about here.]

Table 9 summarizes the analysis of percentage of time attended per page. Children were significantly more attentive during silent reading lessons than they were during oral reading lessons. There was an interaction between lesson type and subject's gender. Figure 1 shows both girls and boys were more attentive during silent reading, but the effect was greatest for boys. There was also an interaction between lesson type and average fluency of the group. Figure 2 shows the advantage for silent reading lessons was most apparent when average group fluency was low, but the advantage became smaller as group fluency increased.[1]

[Insert Table 9 about here.]

[Insert Figures 1 and 2 about here.]

There was a decline in attention over the four days of the study. There was a decline in attention as average sentence length per page increased. There was a possible main effect of page position (p = .016), indicating a decline in attention from the first page to the last page of the story (entry b-weight = -.01). This main effect is qualified by two interactions involving the quadratic of page position. For children who were low in fluency, attention decreased from the first page to the middle of the story and increased toward the end of the story. For children who were high in fluency, attention was fairly constant across pages. There was a similar effect of page position for groups that were heterogeneous in comprehension ability, but not for homogeneous groups.

Finally, Table 9 shows that attention was related to individual comprehension ability. This finding rests on the policy of entering individual measures of ability before group measures, on the grounds that individual measures were logically prior in analyses involving subject as the unit of analysis. Otherwise, group comprehension would have taken precedence because its correlation with attention (r = .47) was slightly greater than that of individual comprehension (r = .45).

Teacher and Student Discussion

Means and standard deviations of measures of discussion by type of lesson, for each class, are presented in Table 10. The unit of analysis was the performance of a group on an individual page or on a story, depending on the measure. For the analysis, percentages of propositions reinstated in discussion, concepts reinstated by teachers in discussion, and concepts reinstated by students in discussion were measured in radians following an arcsine transformation [2 arcsine $\sqrt{p}$]. Number of background-knowledge questions was normalized by taking the square root.

[Insert Table 10 about here.]

Table 11 summarizes the analysis of percentage of propositions reinstated in discussion per page. Silent reading lessons resulted in significantly more propositions being reinstated than did oral reading lessons. There was also a significant effect of sentence length such that longer sentences were associated with more reinstatements of propositions.

[Insert Table 11 about here.]

Table 12 summarizes the analysis of percentage of concepts reinstated in discussion by teachers per page. There was no effect of lesson type. Two properties of pages were significant: (a) more difficult readability was associated with more reinstatements; (b) later pages in the story received fewer reinstatements than did earlier pages. There was a possible interaction of readability of the page with group comprehension level (p = .011). For groups that were low in comprehension, teachers reinstated more concepts as difficulty of the material increased; for groups high in comprehension, teachers reinstated slightly fewer concepts as difficulty increased.

[Insert Table 12 about here.]

Table 13 summarizes the analysis of percentage of concepts reinstated in discussion by students per page. Silent reading lessons produced significantly more reinstatements than did oral reading lessons. Three properties of pages significantly influenced student's reinstatements: (a) longer sentences were associated with more reinstatements; (b) more important information on a page received more reinstatements; (c) there was an effect of page position. The significant effect of the quadratic of page position indicates that reinstatements increased in the first half of the story and declined in the last half.

[Insert Table 13 about here.]

Analysis of the percentage of important propositions reinstated in discussion per story, summarized in Table 14, confirmed the effect of lesson type. This was a story-level variable, so effects of page factors were not examined.

[Insert Table 14 about here.]

The unit of analysis for number of background knowledge and inference questions was the group on a story. There were no effects of lesson type on number of background-knowledge questions ($F(1,32) = .05, p > .01$) or number of inference questions ($F(1,32) = .04, p > .01$). Story had a significant effect on number of inference questions ($F(3,32) = 7.25, p < .01$) and accounted for 40.44% of within-groups variance.

Discussion

Considering first the findings concerning time use, results suggest that pacing of instruction was moderated by two factors. Most interestingly, pacing was moderated by type of lesson. Silent reading lessons proceeded at a slower pace than oral reading lessons. This was because, although children spent less time reading silently, they spent extra time waiting for others to finish before discussion could resume. There was also evidence that they spent more time in page-by-page discussion. On a typical page, children in silent reading lessons spent an average of 26 seconds reading, 13 seconds waiting for others to finish, and 57 seconds discussing content on the page. Children in oral reading lessons spent 33 seconds reading, no time waiting, and 50 seconds discussing content on the page.

The pacing of instruction was also moderated by group ability. Pacing was faster in high-ability groups. This is consistent with findings of Allington (1984a). High-ability groups, specifically those high in fluency, spent less time reading and waiting than did low-ability groups. High-ability groups, specifically those high in comprehension, also spent less time discussing the story. Presumably teachers spent more time discussing a story with low-ability groups to make sure the children understood the material.

Considering next the findings concerning student attention, type of lesson had a highly significant effect relative to other factors. The finding that boys' attention increased most in the silent reading condition, whereas girls' attention was high under both conditions and increased only slightly, is consistent with other data showing that, overall, girls are more attentive than boys (Imai et al., 1992). The finding that attention was sensitive to average fluency of the group during oral reading lessons but not during silent reading lessons suggests that duration of the reading turn and reading errors mediated attention during oral reading (cf. Eder & Felmlee, 1984). This is illustrated by the following transcript from a low-ability group. During this episode, on average, the children attended only 78.22% of the time, compared to 99.74% of the time when the same group read silently from the parallel story:[2]

Teacher:	All right, Chris, go ahead.
Chris:	Uh, because each//
Teacher:	Let's read, please. Page eight.

Chris:	Umm ... [scratches head]
Teacher:	Start at the beginning.
Chris:	[starts reading, haltingly] "EVERY DAY THE TEACHER LETS EACH BIRD... HEAR THE SAME SONG $PLAYING ON THE RE-CORD," SAID M-R-S. PUFF..." AS SOON AS THE BIRD HAS LEARNED THE SONG, HE IS $REALLY TO BE SOLD//
Teacher:	he is...?
Chris:	[reading next sentence] HE IS VALUABLE BECAUSE//
Teacher:	No, no. Start the sentence again. "As soon as ...
Chris:	"AS SOON AS ... | THE BIRD
Teacher:	| Right here [points to place on page]
Chris:	"AS SOON AS THE BIRD HAS $LEARNING THE SONG//
Teacher:	has learned
Chris:	HAS LEARNED THE SONG, HE IS READY TO BE SO-LD, SOLD. HE IS $VAILABLE BECAUSE//
Teacher:	he is...? You people should be following in your books [pointing to children in back of group].
Chris:	$VAIL-A-BLE
Teacher:	Steven?
Steven:	valuable
Teacher:	*valuable*
Chris:	VALUABLE BECAUSE HE CAN SING A BEAUTIFUL SONG."
Teacher:	Okay.

Note that Chris' reading during this episode was extremely labored. He made four errors, a large number of pauses, and was interrupted by the teacher six times. The entire episode took one and a half minutes. After several errors, most of the other children had lost interest in the story and were otherwise preoccupied. The teacher had to draw their attention back to the story at this point.

Finally, considering the findings concerning teacher-student discussion, substantially more story related information--and important information--was discussed during silent reading lessons than during oral reading lessons. The immediate locus of the effect seems to have been students rather than teachers. There was no difference between silent and oral reading lessons in the percentage of concepts reinstated by teachers nor in the numbers of background knowledge and inference questions asked by teachers. Indeed, inspection of the lesson transcripts revealed that teachers asked approximately the same questions about a story, regardless of lesson type or ability level.

Qualitative analysis of the transcripts suggests an explanation for the effect of silent reading lessons on discussion. The effect may have been due to teachers using a more open participation structure and inviting more text-bound responses from children. In silent reading lessons, teachers gave more opportunities for children to participate in discussion and encouraged them to substantiate answers with information from the text. The following transcript, from a middle-ability group in Class A reading silently "Instant Watermelon," provides a vivid example:

Teacher:	Did Mr. Topps believe Herbie's story? Tiana, what do you think?
Tiana:	No.

Teacher:	You don't think he did? What makes you think he didn't? What does your author say that makes you think Mr. Topps doesn't believe Herbie?
Tiana:	He smiled at him.
Teacher:	Okay, and something else?
Hakeemah:	He laughed?
Teacher:	All right. Jimmy?
Jimmy:	Um ... he gave Herbie some//
Teacher:	It was something that Mr. Topps said. Micah?
Micah:	Are you, are you joking.
Teacher:	Okay. Um, Hakeemah?
Hakeemah:	Are you sure?
Teacher:	Well, something else. Look at the top of page ten. Dominique?
Dominique:	[reading from booklet] "Well, I'm not sure."
Teacher:	Okay, "Well, I'm not sure," Mr. Topps laughed.

Compare this with discussion of the same point by the high-ability group in Class A after reading orally:

Teacher:	Do you think Mr. Topps believed Herbie? Jeff?
Jeff:	No.
Teacher:	You don't think so? Okay.

Note that in the excerpt from the silent reading lesson the teacher invited responses from several children and encouraged them to justify their answers with information from the text. Moreover, she asked open-ended questions that made little contact with the text, rather than literal questions that could have made contact with the text (though this was not a feature of *all* silent reading lessons). In this way, the greater number of contacts between discussion and text in silent reading lessons came more often from children than from teachers.

At other times, the reasons why children were more responsive in silent reading lessons were less obvious. For example, the following excerpt comes from a high-ability group in Class D reading silently "Flower Street":

Teacher:	Kristen, what did Mike and Judy do with all the flowers?
Kristen:	They . . . they gave 'em to . . . Mike gave them to every store and Judy gave them to the . . . to the people and um, then a newspaper man was going to take their pictures of the flowers and then um, um . . . I forgot.
Teacher:	All right, Donyal?
Donyal:	Um, Mike and Judy took all the . . . Mike took um, flowers to the stores and Judy took flowers to the houses and then a um, man a newspaper man came to . . . came to take pictures of the flowers then everybody started coming out and taking care of the flowers.
Teacher:	All right.

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Compare this with discussion of the same point by a middle-ability group in Class D after reading orally:

Teacher:	What did Judy do with the flowers, Lisa?
Lisa:	Put them in every window.
Teacher:	Okay.

Here children in the silent reading lesson offered more information from the text and information (about the newspaper man) that went beyond that required to answer the question--without any overt encouragement from the teacher.

Learning

Recall

Means and standard deviations of measures of recall by type of lesson, for each class, are shown in Table 15. The unit of analysis for percentage of propositions recalled was an individual child's performance on an individual page of a story, and the unit of analysis for percentage of important propositions recalled was an individual child's performance on a story.

[Insert Table 15 about here.]

For the analysis, percentages of propositions and of important propositions were measured in radians following an arcsine transformation [2 arcsine $\sqrt{p}$]. Table 16 summarizes the analysis of percentage of propositions recalled per page. Twelve children were absent from lessons on at least one occasion, so their data were excluded from the analysis. Table 16 shows that there was no significant difference in recall between silent and oral reading lessons. There was a significant increase over the four days of the study, and a significant effect due to the particular content and form of the stories.

[Insert Table 16 about here.]

Three properties of information on pages were significantly related to recall of propositions: (a) the more difficult the readability, the less the recall; (b) the more important information there was on a page, the greater the recall (entry *b*-weight = .14); (c) the later the page in a story, the less the recall. Effects of importance and page position were qualified by two significant interactions. Importance had a greater influence on recall for groups that were high in comprehension ability than for groups that were low in comprehension ability. Page position had a greater influence on girls' recall than it did on boys' recall.

Finally, Table 16 shows that recall was significantly related to children's individual comprehension scores; the higher the comprehension score, the better the recall.

Table 17 summarizes the analysis of percentage of important propositions recalled per story. This was a story-level variable, so effects of page properties were not examined. Data from 12 children again were excluded from the analysis. Results in Table 17 parallel those for recall of propositions. There was no significant difference due to lesson type. There was a significant increase over days and a significant effect due to stories. Recall was significantly related to subjects' individual comprehension scores.

[Insert Table 17 about here.]

To understand the role of group processes in contributing to learning, we conducted a path analysis of the relations among type of lesson, group processes, and learning for each dependent measure. Figure 3 shows results of the path analysis for recall of propositions, controlling for story and page properties

and for day of the study. Day had a positive effect on recall but a negative effect on attention. Variables of recall, attention, and propositions in discussion were measured at the page level, while elapsed time was measured at the story level. Results show that positive effects of the silent reading lesson were mediated by propositions in discussion and, to a lesser extent, by student attention. The path coefficient relating attention and recall approached but did not reach significance ($F(1,4062) = 6.45, p = .011$). The total positive indirect effect was .02. This was offset by a negative indirect effect, mediated by elapsed time, of -.03. The net effect on recall was -.01.[3]

[Insert Figure 3 about here.]

The path analysis for recall of important propositions, shown in Figure 4, reveals similar relationships. Variables of recall, important propositions in discussion, and elapsed time were all measured at the story level. In this analysis, the effect of a silent-reading lesson on recall was mediated by important propositions reinstated in discussion. Notable was the failure to place attention on the causal path to recall ($F(1,257) = .11, p = .736$). The path coefficient relating elapsed time and recall approached but did not reach significance ($F(1,258) = 5.50, p = .020$). The positive indirect effect of the silent reading lesson was .05 and the negative indirect effect was -.05. The net effect on recall was -.002.

[Insert Figure 4 about here.]

Passage Reading

Means and standard deviations of measures of passage reading by type of lesson for each class are presented in Table 18. The unit of analysis was an individual child's performance on a passage from a story. For the analysis, reading rate was normalized by taking natural logs, percentage of errors was measured in probits [z-score + 5], and percentage of acceptable errors was measured in radians following an arcsine transformation [2 arcsine $\sqrt{p}$].

[Insert Table 18 about here.]

Tables 19, 20, and 21 summarize the analyses of passage reading measures. Results showed no significant effects of lesson type. There was a significant effect of stories on reading rate and errors. Subject's fluency was positively related to reading rate; subject's comprehension was negatively related to errors but positively related to acceptable errors.

[Insert Tables 19, 20, and 21 about here.]

Figures 5 and 6 show results of path analyses for reading rate and total errors, respectively, controlling for story properties. Variables were measured at the story level. Silent reading lessons had a positive indirect effect on reading rate, mediated by propositions reinstated in discussion, of .02. Against this, there was a negative direct effect of silent reading lessons of -.06, making the net effect -.04. The path coefficient relating measures of discussion and reading rate was not significant ($F(1,253) = 2.04, p = .155$) though this model provided the best possible fit to the data. Results for total errors were similar. There was a negative indirect effect on errors, mediated by propositions reinstated in discussion, of -.08. However, the opposing positive effect (.06) was mediated by lesson time. The net effect was -.02. Path analysis for acceptable errors failed to provide an adequate fit to the data.

[Insert Figures 5 and 6 about here.]

Word Reading

Means and standard deviations of word reading time by type of lesson, for each class, are shown in Table 22. The unit of analysis was an individual child's performance on a list of words from two stories. For the analysis, reading time was normalized by taking natural logs.

[Insert Table 22 about here.]

Table 23 summarizes the analysis of word reading time per list. Results showed no significant effect of lesson type. In the exploratory analysis, there was a significant decrease in reading time over days in the study, though in the final analysis, there were insufficient degrees of freedom to test this effect. Subject's fluency was negatively related to word reading time.

[Insert Table 23 about here.]

Figure 7 shows results of a path analysis of word reading time, controlling for story properties and day of the study. Variables were aggregated to the level of the story pair tested on each list. Silent reading lessons had a negative indirect effect on reading time, mediated by propositions reinstated in discussion, of -.10. Against this, silent reading lessons had a positive direct effect of .08, making the net effect -.02. The path coefficient for the direct effect of silent reading lessons was not significant ($F(1,84) = 3.52$, $p = .064$), though this model provided the best possible fit to the data.

[Insert Figure 7 about here.]

Discussion

Considering first the findings concerning children's recall, the results showed that positive effects of silent reading lessons were indirect and mediated by discussion and attention. A cursory analysis suggests that positive effects of discussion might have been due to rehearsal. Silent reading lessons had most impact on children's (rather than teachers') reinstatements of concepts, and this may have provided opportunities for children to rehearse the story information (cf. Rundus, 1971). A deeper analysis suggests that positive effects might have been due to children's retrieval from memory of story propositions. Invoking the Kintsch and van Dijk (1978) model of comprehension, it could be argued that discussion that made contact with concepts (cf. arguments) contained in previous propositions may have helped children reinstate those propositions in memory, thereby increasing the probability of their recalling them at the end of the lesson (Omanson et al., 1984). Results for attention were weaker. They showed that children paid more attention to the story during silent reading and that the extra attention, or a process supported by the extra attention, caused more story information to be learned (cf. Reynolds & Anderson, 1982; Reynolds, Standiford, & Anderson, 1979). Attention did not lie on the causal path between the silent reading lesson and recall of important propositions. Rather, the extra attention appeared to be an epiphenomenon (cf. Anderson, 1982). Perhaps important propositions were sufficiently well-identified by children's tacit knowledge or story schema, and little further effort was required to learn the information.

The net effect of silent reading lessons on recall was zero because benefits of discussion and attention were offset by a negative effect of elapsed time. Waiting time appears to be the operative factor here because reading time correlated positively with recall--the correlation became negative only when waiting time was added. Three points reinforce the belief that waiting time was responsible for children's poor recall. First, research shows that the forgetting curve is steepest immediately following learning (Ebbinghaus, 1913; Spitzer, 1939). A student's ability to respond to questions deteriorates rapidly with even short delays (Anderson & Faust, 1973). Second, inspection of the videotapes showed that waiting time presented a major opportunity for distraction, not only for children who had finished reading but also for those who were still trying to read. Time per se was not the causal factor, but the interference

time permitted (see Bransford, 1979). Third, the teacher in Class A, unlike the other teachers, directed children to reread while waiting for others to finish and thus provided a quasi-control for effects of waiting time. As shown in Table 15, children from this class showed greater recall following silent reading lessons. Table 24 shows the path coefficients relating group process measures to recall by class. Note that the coefficient for elapsed time for class A is positive and the coefficients for others are negative (and roughly proportional to relative performance). Rereading may have provided an opportunity for rehearsal. However, our preferred interpretation is that forgetting was minimal and positive effects of discussion and attention had a chance to operate.

[Insert Table 24 about here.]

Of course, the evidence that waiting time in silent reading lessons depressed children's recall is correlational, and additional factors might have been responsible. These could have been other negative effects of silent reading not measured in the study, including factors that contribute to poor performance when pace of instruction is slowed, and unidentified benefits of oral reading. One such factor might have been amount of reading actually accomplished. Children who finished reading before others may have failed to do much reading. Oral reading places overt demands for one child to participate, whereas the amount of silent reading actually accomplished can be gauged only indirectly (see Barr, 1986).

Finally, consideration is given to findings concerning passage and word reading. While evidence in support of the path models was weak, one common finding across models was the relationship between discussion and reading time and errors. This seems to indicate that oral use of words from the stories promoted their subsequent identification in print. This is akin to repetition priming in lexical decision tasks in which prior exposure to words enhances speed and accuracy of processing on a subsequent presentation (Forbach, Stanners, & Hochhaus, 1974), even over intervals from 25 minutes to 2 days (Scarborough, Cortese, & Scarborough, 1977; Scarborough, Gerard, & Cortese, 1979).

General Discussion

The purpose of the study was to test a social-organizational hypothesis concerning the way silent reading in small-group lessons operates to influence students' learning. Results can be summarized by reference to the three questions posed at the outset of the study. First, did type of lesson affect group processes? Results showed that type of lesson had dramatic effects on all group processes. As expected, compared to oral reading lessons, children in silent reading lessons were more attentive and reinstated more story information in discussion. The magnitude of the effects was large and would have appeared even larger if, instead of analyzing group and individual performance at the page level, performance had been analyzed at the story level. However, contrary to expectations, silent reading lessons resulted in a slower pace than did the oral reading lessons. This was because, although children spent less time reading silently, they spent extra time waiting for others to finish each page before discussion could resume. There was also evidence that children in silent reading lessons spent more time discussing content on each page.

There can be little doubt that type of lesson had a causal role in shaping group processes. Type of lesson was manipulated experimentally in a within-subjects design, counterbalancing for lesson order and stories. Hence, the effects cannot have been due to the reading abilities or other characteristics of the children, teachers or classroom climate, practice over time, or characteristics of the stories. Nor can effects be attributed to novelty or disruption of group norms. Silent and oral reading were already regular features of small-group instruction in the classes and, in any case, teachers and children had two to three weeks to get accustomed to the treatment before the test lessons.

Second, did type of lesson affect learning? Despite the increased attention and richer discussion in silent reading lessons, results showed no discernible effect of type of lesson on any of the measures of comprehension or fluency. Children showed no difference in recall of propositions nor in recall of

important propositions; no differences in performance on the passage-reading measures (reading rate, percentage of reading errors, percentage of acceptable errors); and no difference in word-reading time. It is possible to argue that some of these measures may have been insensitive to the effects of type of lesson, but it is difficult to make this argument for the entire array of outcome measures.

Third, what role did group processes play in contributing to learning? Most confidence can be placed in the path models for recall because there was good theory and data supporting the models. These analyses showed that attention and discussion correlated positively with recall and mediated the positive effects of silent reading. However, against these benefits, there were the negative effects of the slower pace of silent reading lessons. Waiting time was the major reason for the slower pace, and waiting time correlated negatively with children's recall and seemed to offset completely any benefits accruing from attention and discussion. Less confidence can be placed in the models for passage- and word-reading fluency. There was evidence that discussion mediated the positive effects of silent reading lessons. However, these appear to have been offset by negative--and as yet undetermined--effects of silent reading. In both cases, therefore, the absence of a net benefit of silent reading on children's performance could be traced to the influence of counteracting forces.

These results are consistent with the social-organizational hypothesis that positive effects of silent reading are found in the dynamics of the reading group, at an inter-individual level, and are not necessarily found in direct cognitive consequences for individual students, at an intra-individual level. The principal test of the social-organizational hypothesis was whether group process measures of pacing, student attention, and emphasis on story meaning could be placed on the causal path between type of lesson and learning. While it would have been nice to find a net gain in children's performance following silent reading lessons, such a finding was not necessary to support the hypothesis. Previous research has shown no clear evidence favoring learning following silent reading, and the present research does not change this state of affairs.

The key finding arising from the present study is that benefits of silent reading were socially constructed. The group process measures provide evidence that benefits occurred by virtue of children's membership in the group and not because of cognitive demands of the silent reading task directly on individual students. Attention was mediated by fluency of the reading group, and the holding power of silent reading was relatively greater when group fluency was low. Similarly, reinstatements of story information in silent reading lessons derived from the extended text socially constructed through interactions among teachers and students.

As suggested by Allington (1977, 1980, 1983) and Eder (1982b), major sources of inattention in oral reading lessons were longer reading turns and reading errors. Oral reading errors prompted corrections either from the teacher or other group members, which disrupted the continuity of the lesson, drew attention away from the story, and increased off-task behavior (see also Imai et al., 1992). Call-outs were less frequent and had an uncertain effect on attention; most corrections from children were solicited by the teacher.

Precisely how errors influenced attention was unclear. Errors themselves may not cause inattention. Occasional errors caused children to look up at the teacher, or at the oral reader, or at other group members who might correct the error. These behaviors were coded as indicating attention. Inattention seemed to arise from the slowness with which some children returned their gaze to the booklet after the error was resolved, and from the short-lived nature of the subsequent period of attention. Other sources of inattention in oral reading lessons, especially in low-ability groups, were external interruptions caused by interference from children outside the reading group (e.g., children coming up to the teacher to ask about a seatwork assignment) (cf. McDermott, 1977).

Turning now to the analysis of discussion, the finding of a greater emphasis on story meaning in silent reading lessons is consistent with arguments of Allington (1983) and Durkin (1981), among others, although perhaps not for the reasons they proposed. As shown, there were no significant differences

between silent and oral reading lessons in numbers of background knowledge and inference questions asked by teachers nor in percentage of concepts reinstated by teachers. Rather, students seemed more responsive during silent reading lessons and reinstated more concepts. On the surface, this occurred because teachers in silent reading lessons gave more opportunities for students to participate in discussion and encouraged responses constrained by information from the text.

A deeper analysis suggests several underlying reasons why children were more responsive in discussion following silent reading. On the one hand, teachers might have encouraged children to reinstate more text information because they wanted to make sure children covered the material. This is a plausible explanation and one that fits other evidence from observations of the children's reading discussed below. On the other hand, perhaps discussion of text information following silent reading was a more authentic activity for children (I. L. Beck, personal communication, November 9, 1990). In oral reading lessons, the text was made public when children took turns reading aloud the story. In silent reading lessons, the text was not made public until children had the opportunity to talk about the story with the teacher. Another explanation is that the greater engagement with the text, as measured by attention during reading, was responsible for the more lively discussion.

Having discussed the positive effects of silent reading, consideration now turns to possible negative effects. Benefits from richer discussion and greater attention in silent reading lessons need to be weighed against negative effects of waiting time. The evidence suggested that waiting time may completely offset the benefits of attention and discussion. Children read silently at different speeds, finished reading at different times, and were easily distracted while waiting for others to finish. For example, the following episode in a middle-ability group took place while children were waiting for others (notably Shannon) to finish reading:

Teacher:	Let's read nine and ten. [silent reading]
Clint:	[finishes reading, says to Shannon] Don't read all of it.
Shannon:	[to Clint] No. I'm on page ten.
Clint:	Oh.
Marisa:	Shhhhhh. [silent reading continues]
Shannon:	[points to Kiona's book] You can't read that page.
Kiona:	[to Shannon] I know.
Shannon:	You can't! Don't!
Teacher:	Shannon!
Kiona:	[to Shannon] I'm not readin' it.
Lisa:	[finishes reading, looks at David] Oh, look.
David:	[finishes reading] Mrs (teacher's name), somebody buttoned these together [referring to cuff buttons on jacket sleeve that are buttoned to the opposite sleeve]
Teacher:	I think you did it.
Clint:	I can do that too.
Teacher:	[to Clint] Don't do it. Unbutton it, David. Don't do it. [silent reading continues]
Shannon:	(finished)
Damien:	Did you read that page?
Teacher:	Damien! ... Kevin, why was Lisa silent on the way home?

Here Clint, who finished reading before the other children, disturbed Shannon who was still reading. Shannon in turn disturbed others in the group. As children finished reading, the topic of conversation turned away from the story, which only delayed Shannon from completing his reading of the page.

Caution is warranted, however, as opportunities for distraction presented by waiting time may not be the only factor depressing performance in silent reading lessons. Waiting time may be a marker for other negative effects. For example, some children showed a tendency to skim through the text while silent reading in attempts to finish first. Teachers occasionally reminded children to read properly, saying: "don't worry about who gets done first or second, just read it" or "don't just turn the page because somebody else did." Children who raced through pages also tended to finish early and distract other children who were still reading. The following example comes from a low-ability group:

Teacher:	Well, let's see what happens on Lisa's birthday. Finish reading the story.
Marcus:	[reads, then closes booklet dramatically and makes hand signal to Ryan] I finished before you.
Ryan:	[closes booklet, makes hand back signal to Marcus] No I did.
Teacher:	We are not running a race between you two!
Marcus:	[giggles]
Ryan:	[giggles]
	[silent reading continues]

To ensure children read carefully and do not distract others if they finish early, silent reading lessons may have to be structured carefully so that children are made accountable for thorough silent reading (cf. Allington, 1983). The strategy followed by teacher A in the study was to set a purpose for reading each unit (e.g., "Let's read to find out why . . . .") and always to return to the question in discussion. Moreover, she had children reread while waiting for others to finish. Another strategy attributable to Marjorie Downer, a teacher at Benchmark School in Media, Pennsylvania, who is noted for her exemplary reading program, is to set purposes for reading and to have children who finish early write down points about the story they want to discuss (Anderson, Au, & Jacobs, 1991). These strategies encourage careful reading, reduce the motivation to finish before others, and minimize opportunities for distraction while waiting.

To conclude, the present study has attempted to reformulate conventional ideas about how silent reading operates to produce effects by specifying relations among the silent reading lesson, group processes, and student learning. The major conclusion to be drawn from this study is that benefits of silent reading are socially constructed. Positive effects on student learning are indirect and mediated by the way teachers and students interact in small-group lessons. Therefore, silent reading should be viewed as a contextual variable in much the same way that grouping practices are viewed in transmitting instructional effects (cf. Gamoran, 1987; Hiebert, 1987; Slavin, 1987a, 1987b). Silent reading establishes favorable conditions for, but does not directly influence, student learning. Positive effects depend on how teachers use silent reading.

Importantly, there was no evidence that oral reading was beneficial for children in low-ability groups. Indeed, there was evidence to the contrary. The advantage of silent reading in terms of increased attention was most apparent when average group fluency was low. This is especially surprising when conventional wisdom suggests that low-ability groups should read orally (Allington, 1984b). Clearly, further investigation of silent reading with children in lower grades is needed. Oral reading is even more common in first and second grade, and it is here that implications for instructional policy could be most profound--witness the almost exclusive use of silent reading from first grade in the Kamehameha Early Education Program (see Au, 1981).

The clearest recommendation for instructional practice arising from this study is that, if teachers want to use silent reading in small-group lessons, they need to modify their instruction to accommodate changes in teacher and student behavior that accompany these lessons. The study suggests that teachers need to capitalize on students' increased attention during silent reading and their responsiveness to story content during discussion. The study also suggests they need to make students accountable for thorough

silent reading. Benefits of silent reading may be realized only if teachers organize their lessons to make best use of available time and adapt their instruction to capitalize on group processes occurring during the lessons.

References

Allington, R. L. (1977). If they don't read much, how they ever gonna get good? *Journal of Reading, 21*, 57-61.

Allington, R. L. (1980). Poor readers don't get to read much in reading groups. *Language Arts, 57*, 872-876.

Allington, R. L. (1983). The reading instruction provided readers of differing abilities. *Elementary School Journal, 83*, 548-559.

Allington, R. L. (1984a). Content coverage and contextual reading in reading groups. *Journal of Reading Behavior, 16*, 85-96.

Allington, R. L. (1984b). Oral Reading. In P. D. Pearson (Ed.), *Handbook of reading research* (pp. 829-864). New York: Longman.

Anderson, R. C. (1982). Allocation of attention during reading. In A. Flammer & W. Kintsch (Eds.), *Discourse processing* (pp. 292-305). Amsterdam: North Holland.

Anderson, R. C. (Co-Director), Au, K. H. (Co-Director), & Jacobs, A. (Producer). (1991). *Teaching word identification* [Videotape]. Urbana-Champaign: University of Illinois, Center for the Study of Reading.

Anderson, R. C., & Faust, G. W. (1973). *Educational psychology: The science of instruction and learning*. New York: Dodd, Mead.

Anderson, R. C., Wilkinson, I. A. G., & Mason, J. M. (1991). A microanalysis of the small-group, guided reading lesson: Effects of an emphasis on global story meaning. *Reading Research Quarterly, 26*, 417-441.

Anderson, R. C., Wilkinson, I., Mason, J. M., Shirey, L., & Wilson, P. T. (1988). Do errors on classroom reading tasks slow growth in reading? *Elementary School Journal, 88*, 267-280.

Au, K. H. (1981). *The essential features list of the KEEP reading program* (Language Arts Series No. 3). Honolulu: Kamehameha Early Education Program.

Au, K. H., & Kawakami, A. J. (1984). Vygotskian perspectives on discussion processes in small-group reading lessons. In P. L. Peterson, L. C. Wilkinson, & M. Hallinan (Eds.), *The social context of instruction: Group organization and group processes* (pp. 209-225). Orlando, FL: Academic Press.

Au, K. H., & Mason, J. M. (1981). Social organizational factors in learning to read. *Reading Research Quarterly, 17*, 115-152.

Austin, M. C., & Morrison, C. (1963). *The first R: The Harvard report on reading in elementary school*. New York: Macmillan.

Barr, R. (1973-74). Instructional pace differences and their effect on reading acquisition. *Reading Research Quarterly, 9*, 526-554.

Barr, R. (1975). How children are taught to read: Grouping and pacing. *School Review, 83*, 479-498.

Barr, R. (1986). What we know and what we need to learn about reading instruction. In J. V. Hoffman (Ed.), *Effective teaching of reading: Research and practice* (pp. 293-315). Newark, DE: International Reading Association.

Barr, R., & Dreeben, R. (with Wiratchai, N.). (1983). *How schools work*. Chicago: University of Chicago Press.

Barr, R., & Dreeben, R. (1991). Grouping students for reading instruction. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research* (Vol. 2, pp. 885-910). New York: Longman.

Beebe, M. J. (1980). The effect of different types of substitution miscues on reading. *Reading Research Quarterly, 15*, 324-335.

Betts, E. A. (1946). *Foundations of reading instruction*. New York: American Book Company.

Bransford, J. D. (1979). *Human cognition: Learning, understanding, and remembering*. Belmont, CA: Wadsworth.

Bruner, J. (1985). Vygotsky: A historical and conceptual perspective. In J. V. Wertsch (Ed.), *Culture, communication, and cognition: Vygotskian perspectives* (pp. 21-34). Cambridge: Cambridge University Press.

Burstein, L. (1980). The analysis of multi-level data in educational research and evaluation. *Review of Research in Education, 8*, 158-233.

Cazden, C. B. (1988). *Classroom discourse: The language of teaching and learning*. Portsmouth, NH: Heinemann.

Chinn, C., Waggoner, M., Anderson, R. C., Schommer, M., & Wilkinson, I. A. G. (in press). *Microanalysis of oral reading error episodes* (Tech. Rep.). Urbana-Champaign: University of Illinois, Center for the Study of Reading.

Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.

Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11*, 671-684.

Durkin, D. (1981). Reading comprehension instruction in five basal reader series. *Reading Research Quarterly, 16*, 515-544.

Ebbinghaus, H. (1913). *Memory: A contribution to experimental psychology* (H. A. Ruger & C. E. Bussenius, Trans.). New York: Teachers College, Columbia University. (Original work published in 1885).

Eder, D. (1982a). Differences in communicative styles across ability groups. In L. C. Wilkinson (Ed.), *Communicating in the classroom* (pp. 245-264). New York: Academic Press.

Eder, D. (1982b). The impact of management and turn-allocation activities on student performance. *Discourse Processes*, *5*, 147-159.

Eder, D., & Felmlee, D. (1984). The development of attention norms in ability groups. In P. Peterson, L. Wilkinson, & N. Hallinan (Eds.), *The social context of instruction* (pp. 189-208). Orlando, FL: Academic Press.

Elgart, D. B. (1978). Oral reading, silent reading and listening comprehension: A comparative study. *Journal of Reading Behavior*, *10*, 203-207.

Elley, W. B. (1985). *Lessons learned about LARIC*. Canterbury: University of Canterbury.

Fielding, L. G. (1989). The role of discussion questions in children's story comprehension (Doctoral dissertation, University of Illinois at Urbana-Champaign, 1988). *Dissertation Abstracts International*, *49*, 2599A.

Forbach, G. B., Stanners, R. F., & Hochhaus, L. (1974). Repetition and practice effects in a lexical decision task. *Memory & Cognition*, *2*, 337-339.

Forman, E. A., & Cazden, C. B. (1985). Exploring Vygotskian perspectives in education: The cognitive value of peer interaction. In J. Wertsch (Ed.), *Culture, communication, and cognition: Vygotskian perspectives* (pp. 323-347). Cambridge: Cambridge University Press.

Freebody, P., & Anderson, R. C. (1986). Serial position and rated importance in the recall of text. *Discourse Processes*, *9*, 31-36.

Gamoran, A. (1987). Organization, instruction, and the effects of ability grouping: Comment on Slavin's "best-evidence synthesis." *Review of Educational Research*, *57*, 341-345.

Gaskins, I. W., & Elliot, T. T. (1991). *Implementing cognitive strategy instruction across the school: The Benchmark manual for teachers*. Cambridge, MA: Brookline Books.

Goetz, E. T., Anderson, R. C., & Schallert, D. L. (1981). The representation of sentences in memory. *Journal of Verbal Learning and Verbal Behavior*, *20*, 369-385.

Goodlad, J. I. (1984). *A place called school*. New York: McGraw-Hill.

Goodman, Y. M., Watson, D. J., & Burke, C. L. (1987). *Reading miscue inventory: Alternative procedures*. New York: Richard C. Owen.

Gray, W. S. (1956). *The teaching of reading and writing*. Chicago: UNESCO, Scott Foresman.

Gumperz, J. J., & Hernandez-Chavez, E. (1972). Bilingualism, bidialectalism, and classroom interaction. In C. B. Cazden, V. P. John, & D. Hymes (Eds.), *Functions of language in the classroom* (pp. 84-108). Prospect Heights, IL: Waveland Press.

Hale, A., & Edwards, T. (1981). Hearing children read. In J. Edwards (Ed.), *The social psychology of reading* (Vol. 1, pp. 117-130). Silver Spring, MD: Institute of Modern Language.

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Hallinan, M. (1984). Summary and implications. In P. L. Peterson, L. C. Wilkinson, & M. Hallinan (Eds.), *The social context of instruction* (pp. 229-240). Orlando, FL: Academic Press.

Harker, J. O. (1989). Contrasting the content of two story-reading lessons: A propositional analysis. In J. L. Green & J. O. Harker (Eds.), *Multiple perspective analyses of classroom discourse* (Vol. 28, *Advances in Discourse Processes*, pp. 49-70). Norwood, NJ: Ablex.

Harris, A. J., & Sipay, E. R. (1985). *How to increase reading ability* (8th ed.). New York: Longman.

Harris, T. L., Creekmore, M., Matteoni, L., & Allen, H. B. (1975). *Keys to reading.* Oklahoma City: Economy.

Heap, J. L. (1980). What counts as reading: Limits to certainty in assessment. *Curriculum Inquiry, 10*, 265-292.

Herman, P. A. (1985). The effect of repeated readings on reading rate, speech pauses and word recognition accuracy. *Reading Research Quarterly, 20*, 553-565.

Hiebert, E. H. (1983). An examination of ability grouping for reading instruction. *Reading Research Quarterly, 18*, 231-255.

Hiebert, E. H. (1987). The context of instruction and student learning: An examination of Slavin's assumptions. *Review of Educational Research, 57*, 337-340.

Hoffman, J. V. (1981). Is there a legitimate place for oral reading instruction in a developmental reading program? *Elementary School Journal, 81*, 305-310.

Howlett, N., & Weintraub, S. (1979). Instructional procedures. In R. Calfee & P. Drum (Eds.), *Teaching reading in compensatory classes* (pp. 87-103). Newark, DE: International Reading Association.

Imai, M., Anderson, R. C., Wilkinson, I. A. G., & Yi, H. (1992). Properties of attention during reading lessons. *Journal of Educational Psychology, 84*, 160-173.

Johnson, R. E. (1970). Recall of prose as a function of the structural importance of the linguistic units. *Journal of Verbal Learning and Verbal Behavior, 9*, 12-20.

Juel, C. (1990). Effects of reading group assignment on reading development in first and second grade. *Journal of Reading Behavior, 22*, 233-254.

Kintsch, W., & van Dijk, T. A. (1978). Toward a model of text comprehension and production. *Psychological Review, 85*, 363-394.

Kirk, R. E. (1982). *Experimental design: Procedures for the behavioral sciences*. Belmont, CA: Books/Cole.

Kurth, R. J., & Kurth, L. M. (1987, April). *The use of time in formal reading instruction in elementary schools*. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.

Langer, J. A., Applebee, A. N., Mullis, I. V. S., & Foertsch, M. A. (1990). *Learning to read in our nation's schools: Instruction and achievement in 1988 at grades 4, 8, and 12.* Princeton, NJ: Educational Testing Service.

Leinhardt, G., Zigmond, N., & Cooley, W. W. (1981). Reading instruction and its effects. *American Educational Research Journal, 18,* 343-361.

Lorch, R. F., Jr., & Myers, J. L. (1990). Regression analyses of repeated measures data in cognitive research. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 16,* 149-157.

Mason, J., & Osborn, J. (1982). *When do children begin "reading to learn"?: A survey of classroom reading instruction practices in grades two through five* (Tech. Report No. 261). Urbana-Champaign: University of Illinois, Center for the Study of Reading.

McDermott, R. P. (1977). Kids made sense: An ethnograhic account of the interactional management of success and failure in one first-grade classroom (Doctoral dissertation, Stanford University, 1976). *Dissertation Abstracts International, 38,* 1505A.

McDermott, R. P., & Aron, J. (1978). Pirandello in the classroom: On the possibility of equal educational opportunity in American culture. In M. C. Reynolds (Ed.), *Futures of education for exceptional students: Emerging structures* (pp. 41-64). Reston, VA: Council for Exceptional Children.

McGill-Franzen, A., & McDermott, P. (1978, December). *Negotiating a reading diagnosis.* Paper presented at the annual meeting of the National Reading Conference, St. Petersburg, FL.

Mead, C. D. (1915). Silent versus oral reading with 100 sixth-grade children. *Journal of Educational Psychology, 6,* 345-348.

Meyer, L. A., Linn, R. L., & Hastings, C. N. (1985). *The heuristic and measurement models driving a study of reading comprehension and science knowledge* (Tech. Rep. No. L-2). Urbana-Champaign: University of Illinois, Center for the Study of Reading.

Niles, J. A., Winstead, J. C., Graham, R. T. (1977). Effects of teachers' response strategies on children's oral reading performance: A case of interference? *Reading in Virginia, 5,* 25-28.

Omanson, R. C., Beck, I. L., Voss, J. F., & McKeown, M. G. (1984). The effects of reading lessons on comprehension: A processing description. *Cognition and Instruction, 1,* 45-67.

Pedhazur, E. J. (1982). *Multiple regression in behavioral research.* New York: Holt, Rinehart & Winston.

Pehrsson, R. S. V. (1974). The effects of teacher interference during the process of reading, or how much of a helper is Mr. Gelper? *Journal of Reading, 17,* 617-621.

Quirk, T. J., Trismen, D. A., Nalin, K. B., & Weinberg, S. F. (1975). The classroom behavior of teachers during compensatory reading instruction. *Journal of Educational Research, 68,* 185-192.

Raudenbush, S. W., & Bryk, A. S. (1988). Methodological advances in analyzing the effects of schools and classrooms on student learning. In E. Z. Rothkopf (Ed.), *Review of research in education* (Vol. 15, pp. 423-475). Washington, DC: American Educational Research Association.

Reynolds, R. E., & Anderson, R. C. (1982). Influence of questions on the allocation of attention during reading. *Journal of Educational Psychology, 5*, 623-632.

Reynolds, R. E., Standiford, S. N., & Anderson, R. C. (1979). Distribution of reading time when questions are asked about a restricted category of text information. *Journal of Educational Psychology, 71*, 183-190.

Rundus, D. (1971). Analysis of rehearsal processes in free recall. *Journal of Experimental Psychology, 89*, 63-77.

SAS Institute. (1985). *SAS user's guide: Statistics, version 5 edition*. Cary, NC: SAS Institute.

Scarborough, D. L., Cortese, C., & Scarborough, H. S. (1977). Frequency and repetition effects in lexical memory. *Journal of Experimental Psychology: Human Perception and Performance, 3*, 1-17.

Scarborough, D. L., Gerard, L., & Cortese, C. (1979). Accessing lexical memory: The transfer of word repetition effects across task and modality. *Memory & Cognition, 7*, 3-12.

Slavin, R. E. (1987a). Ability grouping and student achievement in elementary schools: A best-evidence synthesis. *Review of Educational Research, 57*, 293-336.

Slavin, R. E., (1987b). Ability grouping in elementary schools: Do we really know nothing until we know everything? *Review of Educational Research, 57*, 347-350.

Spitzer, H. F. (1939). Studies in retention. *Journal of Educational Psychology, 30*, 641-656.

SPSS. (1988). *SPSS^x user's guide* (3rd ed.). Chicago: SPSS.

Stallings, J. (1980). Allocated academic learning time revisited, or beyond time on task. *Educational Researcher, 9*, 11-16.

Stanhope, N., & Parkin, A. J. (1987). Further explorations of the consistency effect in word and nonword pronunciation. *Memory & Cognition, 15*, 169-179.

Stanovich, K. E., Cunningham, A. E., & Feeman, D. J. (1984). Intelligence, cognitive skills, and early reading progress. *Reading Research Quarterly, 19*, 278-303.

Valencia, S. W., Pearson, P. D., Reeve, R., & Shanahan, T. (1988). *Illinois Goal Assessment Program: Reading*. Springfield: Illinois State Board of Education.

Weiderholt, J. L., & Bryant, B. R. (1986). *Gray oral reading tests--revised*. Austin, TX: Pro-ed.

Weinstein, R. S. (1976). Reading group membership in first grade: Teachers behaviors and pupil experience over time. *Journal of Educational Psychology, 68*, 103-116.

Wertsch, J. V. (1985). *Vygotsky and the social formation of mind*. Cambridge, MA: Harvard University Press.

Wilkinson, I., Anderson, R. C., & Pearson, P. D. (1988, April). *Silent reading: A best-evidence synthesis*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

Wilkinson, I., Wardrop, J. L., & Anderson, R. C. (1988). Silent reading reconsidered: Reinterpreting reading instruction and its effects. *American Educational Research Journal*, *25*, 127-144.

Footnotes

[1]The analysis on which Figures 1 and 2 are based assumes a linear relationship between percentage of time attended and the independent variables. However, even with the logit transformation, attention was highly negatively skewed and had a nonlinear relationship with the independent variables. There were large errors of estimate at low rates of attention, and standard errors were inflated. Hence, the figures overestimate mean percentage of time attended and the tests of significance shown in Table 9 are actually too conservative. We plan to conduct a more complete, event history analysis of these attention data in the near future.

[2]The following notations are used in this and other examples: // refers to an interruption, CAPITALS refers to reading aloud, $ refers to an oral reading error, [ ] refers to nonverbal behavior, | refers to simultaneous talk, underlining refers to contacts with text, (word) refers to an unclear utterance.

[3]In the parallel path analysis, in which the group rather than the student was the unit of analysis for attention and recall, results failed to place attention on the causal path to recall ($F(1,513) = 3.01$, $p = .083$). Indeed, the direction of the relationship was negative (beta = -.04).

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Table 1

Assignment of Treatments and Stories to Groups by Day

Middle-Class School							
Class		2-3wks	Day 1	Day 2	2-3wks	Day 3	Day 4
A	Group 1	Social	OR-IW	OR-LS	Social	SR-FS	SR-AOJ
	Group 2	Social	OR-FS	OR-AOJ	Social	SR-IW	SR-LS
	Group 3	Social	OR-LS	OR-IW	Social	SR-AOJ	SR-FS
B	Group 4	Social	SR-IW	SR-LS	Social	OR-FS	OR-AOJ
	Group 5	Social	SR-FS	SR-AOJ	Social	OR-IW	OR-LS
	Group 6	Social	SR-LS	SR-IW	Social	OR-AOJ	OR-FS
Working-Class School							
Class		2-3wks	Day 1	Day 2	2-3wks	Day 3	Day 4
C	Group 7	Social	OR-FS	OR-AOJ	Social	SR-IW	SR-LS
	Group 8	Social	OR-IW	OR-LS	Social	SR-FS	SR-AOJ
	Group 9	Social	OR-AOJ	OR-FS	Social	SR-LS	SR-IW
D	Group 10	Social	SR-FS	SR-AOJ	Social	OR-IW	OR-LS
	Group 11	Social	SR-IW	SR-LS	Social	OR-FS	OR-AOJ
	Group 12	Social	SR-AOJ	SR-FS	Social	OR-LS	OR-IW

Note. SR = silent reading; OR = oral reading; FS = Flower Street; IW = Instant Watermelon; LS = Lisa's Song; AOJ = Any Old Junk; Social = socialization

Table 2

Description of Independent Variables

Variable	Measurement Scale/Method	Meaning of High Positive Score	*M*	*SD*
Within-Subjects				
Day	1, 2, 3, 4	Last	2.50	1.13
Position in Day	1, 2, 3	Last	2.00	.83
Prior Exposures to Story	1, 2, 3	Many	2.00	.83
Silent vs Oral	1, -1	Silent Reading	.00	1.00
Readability of Page	Grade Level	Difficult	3.09	1.55
Sentence Length on Page	Mean words per sentence	Long	8.79	1.85
Word Length on Page	Mean syllables per word	Long	1.28	.10
Importance of Page	Proportion	Important	.47	.24
Position of Page	Serial Position	End	6.50	3.49
Between-Subjects				
Comprehension	Local Stanine	High	5.00	2.00
Fluency	Local Stanine	High	5.00	2.00
Gender	1, -1	Girl	.04	1.00
Ethnicity	1, -1	Minority	-.25	.97
Socioeconomic Status	1, -1	Low	-.06	1.00
Group Gender	Proportion	Mostly Girls	.53	.18
Group Ethnicity	Proportion	Mostly Minorities	.40	.22
Group Socioeconomic Status	Proportion	Mostly Low	.48	.23
Group Comprehension	Mean of Local Stanines	High	5.05	1.55
Group Fluency	Mean of Local Stanines	High	4.99	1.37
Group Heterogeneity in Comprehension	Standard Deviation of Local Stanines	Heterogeneous	1.31	.34
Group Heterogeneity in Fluency	Standard Deviation of Local Stanines	Heterogeneous	1.53	.33
Group Size	Number of Students	Large	8.33	2.31

Table 3

Means and (Standard Deviations) of Time Spent in Reading Lessons by Type of Lesson for Each Class (Minutes)

Variable	Class	Silent	Oral
Lesson time	A	19.73 (4.02)	17.35 (4.30)
	B	20.31 (4.09)	19.50 (4.78)
	C	26.65 (4.14)	21.01 (3.66)
	D	17.48 (4.40)	13.39 (3.60)
Reading time	A	5.79 (1.40)	7.21 (2.56)
	B	5.45 (1.22)	6.67 (2.02)
	C	5.26 (0.63)	7.09 (1.92)
	D	4.22 (0.53)	5.04 (0.59)
Waiting time	A	2.71 (0.86)	n.a.
	B	2.00 (0.45)	n.a.
	C	3.17 (0.79)	n.a.
	D	2.15 (1.14)	n.a.
Page-by-page discussion time	A	10.16 (1.89)	9.18 (2.15)
	B	8.09 (1.81)	9.83 (4.03)
	C	17.67 (3.01)	13.23 (1.97)
	D	10.00 (2.76)	7.49 (2.29)
Pre- & post-reading discussion time	A	1.07 (0.90)	.97 (0.74)
	B	4.76 (3.96)	3.01 (2.32)
	C	.55 (0.62)	.69 (0.62)
	D	1.11 (0.93)	.86 (1.14)

Note. n.a. = not applicable

Table 4

Analysis of Lesson Time (Minutes)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Groups					
Group fluency	1	513.67	58.22	-2.42	13.93*
Residual	10	368.64			
Within-Groups					
Silent vs oral	1	124.97	30.99	1.61	15.75*
Story	3	24.32	6.03	a	1.02
Group x Silent vs oral x Story/Residual	32	253.93			

* $p < .01$

aThree orthogonal contrasts omitted

Table 5

Analysis of Reading Time (Natural Logs)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Groups					
Group fluency	1	2.04	86.07	-.15	61.78*
Residual	10	.33			
Within-Groups					
Silent vs oral	1	.45	45.30	-.10	54.03*
Story	3	.27	27.87	a	11.08*
Group x Silent vs oral x Story/Residual	32	.26			

* $p < .01$
[a]Three orthogonal contrasts omitted

Table 6

Analysis of Elapsed Time (Natural Logs)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Groups					
Group fluency	1	2.01	86.10	-.15	61.95*
Residual	10	.32			
Within-Groups					
Silent vs oral	1	.41	37.06	.09	34.41*
Story	3	.31	28.48	a	8.82*
Group x Silent vs oral x Story/Residual	32	.38			

* $p < .01$
[a]Three orthogonal contrasts omitted

Table 7

Analysis of Page-by-Page Discussion Time (Natural Logs)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Groups					
Group comprehension	1	2.20	50.37	-.14	10.15*
Residual	10	2.17			
Within-Groups					
Silent vs oral	1	.23	14.14	.07	7.12
Story	3	.36	22.31	a	3.74
Group x Silent vs oral x Story/Residual	32	1.02			

* $p < .01$

[a]Three orthogonal contrasts omitted

Table 8

Means and (Standard Deviations) of Percentage of Time Attended per Page by Type of Lesson for Each Class

Class	Silent	Oral
A	96.84 (6.97)	93.80 (13.29)
B	97.28 (7.13)	89.65 (19.94)
C	94.46 (12.47)	88.25 (21.26)
D	95.37 (9.71)	85.00 (22.71)

Table 9

Analysis of Percentage of Time Attended per Page (Logits)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Subjects					
Subject's comprehension	1	135.17	20.61	.10	27.36*
Subject's fluency	1	18.65	2.84	-.14	3.78
Subject's sex	1	5.72	.87	.05	1.16
Group fluency	1	22.62	3.45	.07	4.58
Group heterogeneity in comprehension	1	9.05	1.38	.27	1.83
Residual	94	464.47			
Within-Subjects					
Day	1	39.21	.88	-.10	8.03*
Subject x Day	99	483.35			
Silent vs oral	1	43.91	.98	.54	24.78*
Story	3	6.54	.15	a	1.23
Silent vs oral x Subject's gender	1	12.22	.27	-.07	6.90*
Silent vs oral x Group fluency	1	14.76	.33	-.06	8.33*
Subject x Silent vs oral x Story	180	318.88			
Sentence length	1	9.15	.21	-.03	12.47*
Subject x Sentence length	99	72.62			
Page position	1	5.43	.12	.05	6.06
Page position x Subject's fluency	1	1.75	.04	.02	1.96
Page position x Group heterogeneity in comprehension	1	.71	.02	-.16	.79
Subject x Page position	97	86.93			
(Page position)^2	1	3.30	.07	-.00	4.41
(Page position)^2 x Subject's fluency	1	7.60	.17	-.00	10.16*
(Page position)^2 x Group heterogeneity in comprehension	1	7.70	.17	.01	10.28*
Subject x (Page position)^2	97	72.59			
Residual	3910	3272.23			

[a]Three orthogonal contrasts omitted

* $p < .01$

Table 10

Means and (Standard Deviations) of Text Reinstatements and Questions by Type of Lesson for Each Class

Variable	Class	Silent	Oral
Percentage of propositions reinstated	A	52.33 (23.16)	31.21 (20.66)
	B	36.88 (20.88)	36.37 (21.07)
	C	52.52 (22.22)	49.89 (24.71)
	D	48.70 (25.47)	32.14 (22.91)
Percentage of concepts reinstated by teacher	A	35.43 (17.25)	24.33 (16.13)
	B	24.27 (14.06)	24.97 (12.91)
	C	35.55 (17.87)	35.66 (19.43)
	D	16.17 (12.88)	15.20 (13.23)
Percentage of concepts reinstated by students	A	35.75 (19.76)	18.52 (17.25)
	B	21.28 (17.81)	19.75 (16.07)
	C	34.80 (19.83)	27.32 (19.94)
	D	39.14 (24.84)	23.31 (19.74)
Percentage of important propositions reinstated	A	60.31 (6.70)	38.73 (9.42)
	B	49.57 (5.26)	47.41 (3.53)
	C	63.28 (8.25)	60.77 (9.82)
	D	62.66 (10.36)	43.59 (13.12)
Number of background-knowledge questions	A	1.33 (1.51)	1.67 (1.21)
	B	2.67 (1.63)	2.17 (0.75)
	C	2.50 (1.97)	2.17 (1.17)
	D	1.00 (1.10)	0.67 (0.82)
Number of inference questions	A	6.83 (2.14)	8.50 (3.39)
	B	8.50 (2.43)	8.00 (3.22)
	C	12.67 (4.84)	12.33 (5.79)
	D	10.67 (3.39)	9.17 (2.71)

Table 11

Analysis of Percentage of Propositions Reinstated per Page (Radians)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Groups	11	13.48	100		
Within-Groups					
Silent vs oral	1	10.20	4.83	.13	20.02*
Story	3	7.30	3.46	a	4.78*
Group x Silent vs oral x Story	32	16.30			
Sentence length	1	8.13	3.85	.05	12.57*
Group x Sentence length	11	7.11			
Residual	516	162.24			

[a]Three orthogonal contrasts omitted
*$p < .01$

Table 12

Analysis of Percentage of Concepts Reinstated by Teachers per Page (Radians)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Groups					
Group comprehension	1	4.28	21.42	.01	2.14
Residual	10	20.00			
Within-Groups					
Silent vs oral	1	.75	.74	.04	3.10
Story	3	1.28	1.27	a	1.77
Group x Silent vs oral x Story	32	7.71			
Readability	1	2.16	2.14	.13	13.88*
Group comprehension x Readability	1	1.50	1.49	-.02	9.69
Group x Readability	10	1.55			
Page position	1	2.06	2.04	-.02	10.11*
Group x Page position	11	2.24			
Residual	504	81.60			

[a]Three orthogonal contrasts omitted
*$p < .01$

Table 13

Analysis of Percentage of Concepts Reinstated by Students per Page (Radians)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Groups	11	10.88	100		
Within-Groups					
Silent vs oral	1	11.99	6.97	.14	39.33*
Story	3	8.01	4.66	a	8.76*
Group x Silent vs oral x Story	32	9.76			
Sentence length	1	11.85	6.89	.06	61.15*
Group x Sentence length	11	2.13			
Importance	1	2.15	1.25	.38	13.57*
Group x Importance	11	1.74			
Page position	1	.11	.06	.08	1.06
Group x Page position	11	1.09			
(Page position)^2	1	1.91	1.11	-.01	19.17*
Group x (Page position)^2	11	1.10			
Residual	480	120.14			

[a]Three orthogonal contrasts omitted
*$p < .01$

Table 14

Analysis of Reinstatements of Important Propositions in Discussion (Radians)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Groups	11	.21	100		
Within-Groups					
Silent vs oral	1	.15	31.70	.06	16.50*
Story	3	.03	6.83	a	1.18
Group x Silent vs oral x Story/Residual	32	.30			

*$p < .01$
[a]Three othogonal contrasts omitted

Table 15

Means and (Standard Deviations) of Recall Measures by Type of Lesson for Each Class

Variable	Class	Silent	Oral
Percentage of propositions per page	A	25.93 (26.50)	17.99 (21.29)
	B	10.87 (15.35)	17.01 (21.68)
	C	21.18 (22.90)	22.00 (24.92)
	D	13.90 (20.68)	17.25 (22.41)
Percentage of important propositions per story	A	30.86 (18.97)	24.06 (14.52)
	B	16.11 (8.59)	20.85 (12.32)
	C	26.12 (13.42)	27.13 (15.94)
	D	18.49 (15.29)	22.69 (16.05)

Table 16

Analysis of Percentage of Propositions Recalled per Page (Radians)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Subjects					
Subject's comprehension	1	39.65	8.46	.04	7.94*
Subject's gender	1	9.73	2.08	.10	1.95
Group comprehension	1	.23	.05	-.03	.05
Residual	84	419.24			
Within-Subjects					
Day	1	22.72	1.41	.07	19.30*
Subject x Day	87	102.40			
Silent vs oral	1	.51	.03	-.01	.98
Story	3	39.64	2.47	a	25.44*
Subject x Silent vs oral x Story	172	89.35			
Readability	1	5.45	.34	-.03	14.19*
Subject x Readability	87	33.43			
Importance	1	3.85	.24	-.20	12.83*
Importance x Group comprehension	1	3.54	.22	.08	11.81*
Subject x Importance	86	25.80			
Page position	1	4.29	.27	-.01	13.04*
Page position x Subject's gender	1	3.25	.20	-.01	9.87*
Subject x Page position	86	28.29			
Residual	3608	1244.99			

[a]Three orthogonal contrasts omitted
*$p < .01$

Table 17

Analysis of Percentage of Important Propositions Recalled per Story (Radians)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Subjects					
Subject's comprehension	1	4.52	11.07	.06	10.70*
Residual	86	36.30			
Within-Subjects					
Day	1	1.44	8.54	.06	22.37*
Subject x Day	87	5.62			
Silent vs oral	1	.01	.07	-.01	.26
Story	3	1.49	8.83	a	10.26*
Subject x Silent vs oral x Story/Residual	172	8.35			

[a]Three orthogonal contrasts omitted
*$p < .01$

Table 18

Means and (Standard Deviations) of Passage Reading Measures by Type of Lesson for Each Class

Variable	Class	Silent	Oral
Reading rate (words per minute)	A	107.25 (30.02)	106.65 (27.88)
	B	115.76 (38.56)	116.78 (37.59)
	C	104.14 (37.40)	102.55 (34.19)
	D	116.61 (25.31)	124.05 (20.74)
Percentage of errors	A	4.52 (3.76)	5.50 (3.92)
	B	5.02 (2.76)	4.48 (3.04)
	C	7.01 (4.03)	5.83 (4.05)
	D	4.57 (3.17)	5.69 (4.49)
Percentage of acceptable errors	A	82.41 (18.04)	79.52 (20.36)
	B	75.03 (22.63)	78.06 (19.89)
	C	74.17 (20.82)	75.45 (22.60)
	D	77.53 (19.81)	80.36 (16.37)

Table 19

Analysis of Reading Rate (Natural Logs)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Subjects					
Subject's fluency	1	23.19	89.87	.13	754.15*
Residual	85	2.61			
Within-Subjects					
Silent vs oral	1	.03	1.13	-.01	3.94
Story	3	.71	25.37	a	29.56*
Subject x Silent vs oral x Story/Residual	257	2.06			

*$p < .01$
[a]Three orthogonal contrasts omitted

Table 20

Analysis of Percentage of Errors (Probits)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Subjects					
Subject's comprehension	1	7.96	34.35	-.08	44.47*
Residual	85	15.21			
Within-Subjects					
Silent vs oral	1	.01	.10	-.01	.28
Story	3	1.17	8.42	a	7.88*
Subject x Silent vs oral x Story/Residual	257	12.72			

*$p < .01$
[a]Three orthogonal contrasts omitted

Table 21

Analysis of Percentage of Acceptable Errors (Radians)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Subjects					
Subject's comprehension	1	24.16	35.10	.14	45.42*
Residual	84	44.68			
Within-Subjects					
Silent vs oral	1	.01	.02	-.01	.04
Story	3	1.96	3.08	a	2.69
Subject x Silent vs oral x Story/Residual	254	61.56			

[a]Three orthogonal contrasts omitted
*$p < .01$

Table 22

Means and (Standard Deviations) of Word Reading Time by Type of Lesson for Each Class (Seconds)

Class	Silent	Oral
A	16.54 (6.82)	19.67 (10.42)
B	18.53 (10.51)	16.26 (7.96)
C	22.40 (11.21)	24.82 (14.71)
D	18.02 (7.77)	16.89 (6.54)

Table 23

Analysis of Reading Time (Natural Logs)

Source	*df*	*SS*	% Variance	*b*	*F*
Between-Subjects					
Subject's fluency	1	26.26	77.83	-.20	301.97*
Residual	86	7.48			
Within-Subjects					
Silent vs oral	1	.01	.35	-.01	.32
Story pair	1	.17	5.12	.06	4.66
Subject x Silent vs oral x Story/Residual	86	3.16			

*$p < .01$

Table 24

Path Coefficients Relating Group Processes to Recall of Propositions on Page by Class

Group Process	Path Coefficients			
	Class A	Class B	Class C	Class D
Attention	.01	.04	.03	.06
Propositions in Discussion	.09	.09	.01	.08
Elapsed Time	.11	-.18	-.08	-.17

Figure 1

Percentage of Time Attended as a Function of Type of Lesson and Gender

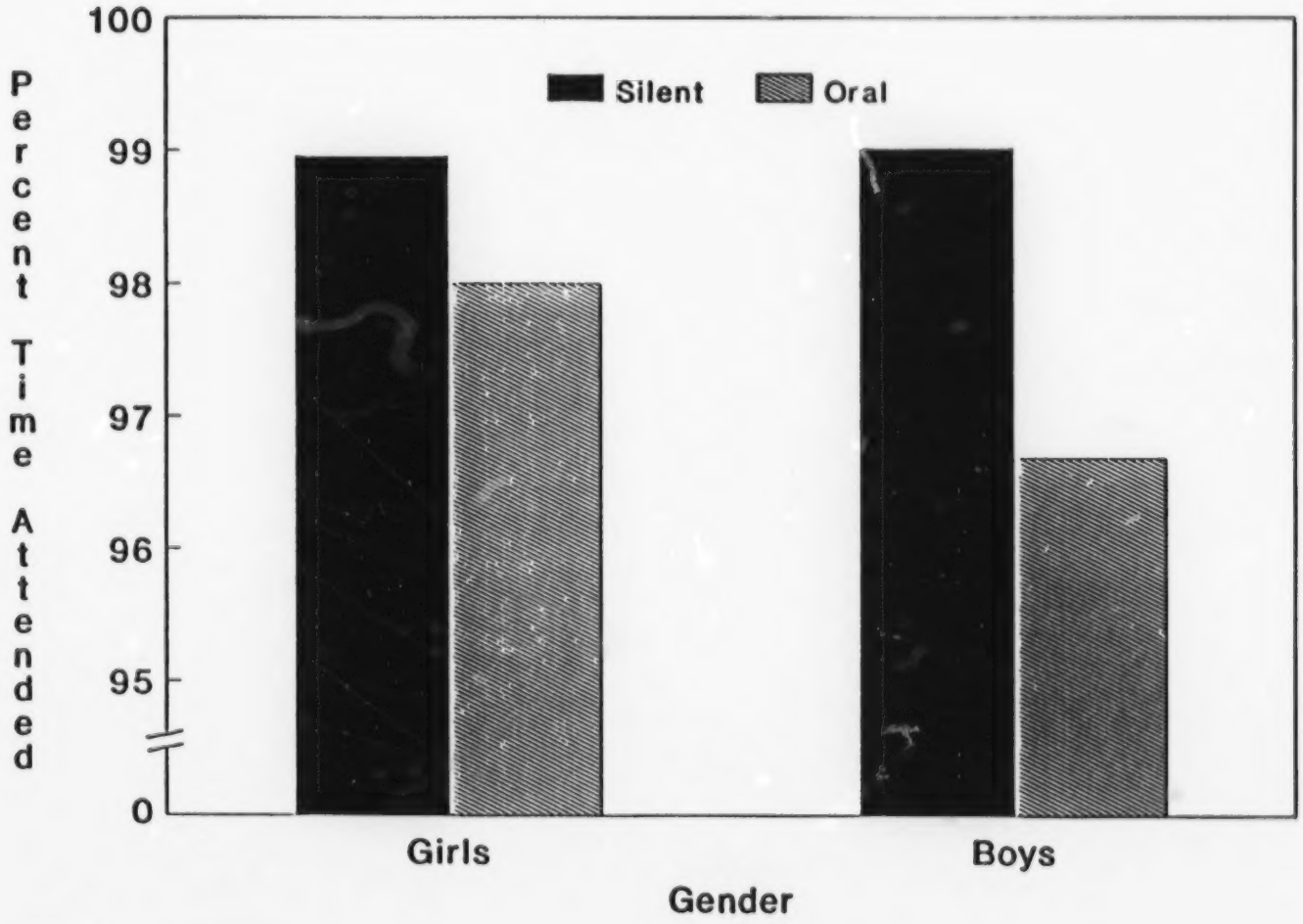

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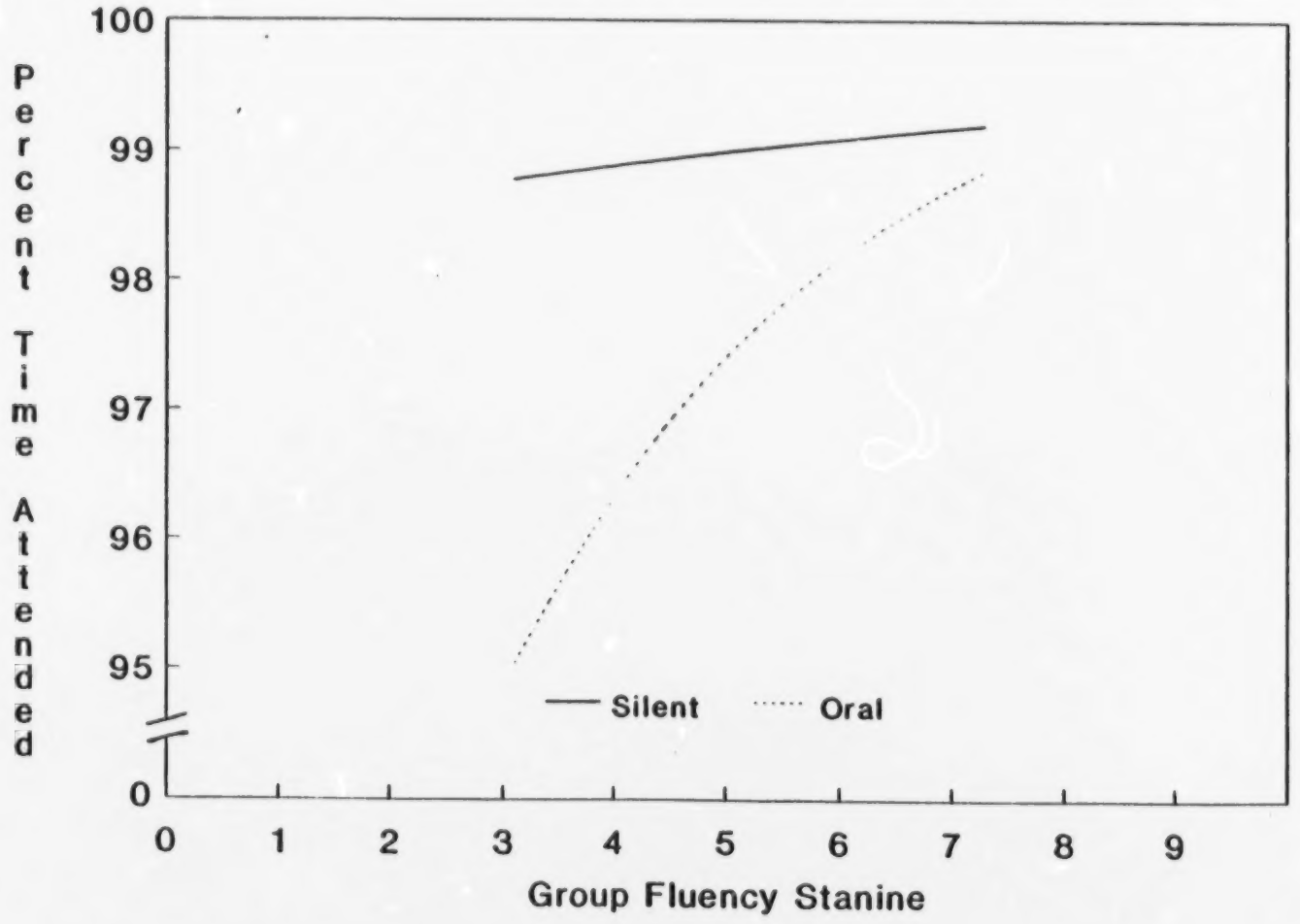
Figure 2

Percentage of Time Attended as a Function of Type of Lesson and Average Group Fluency



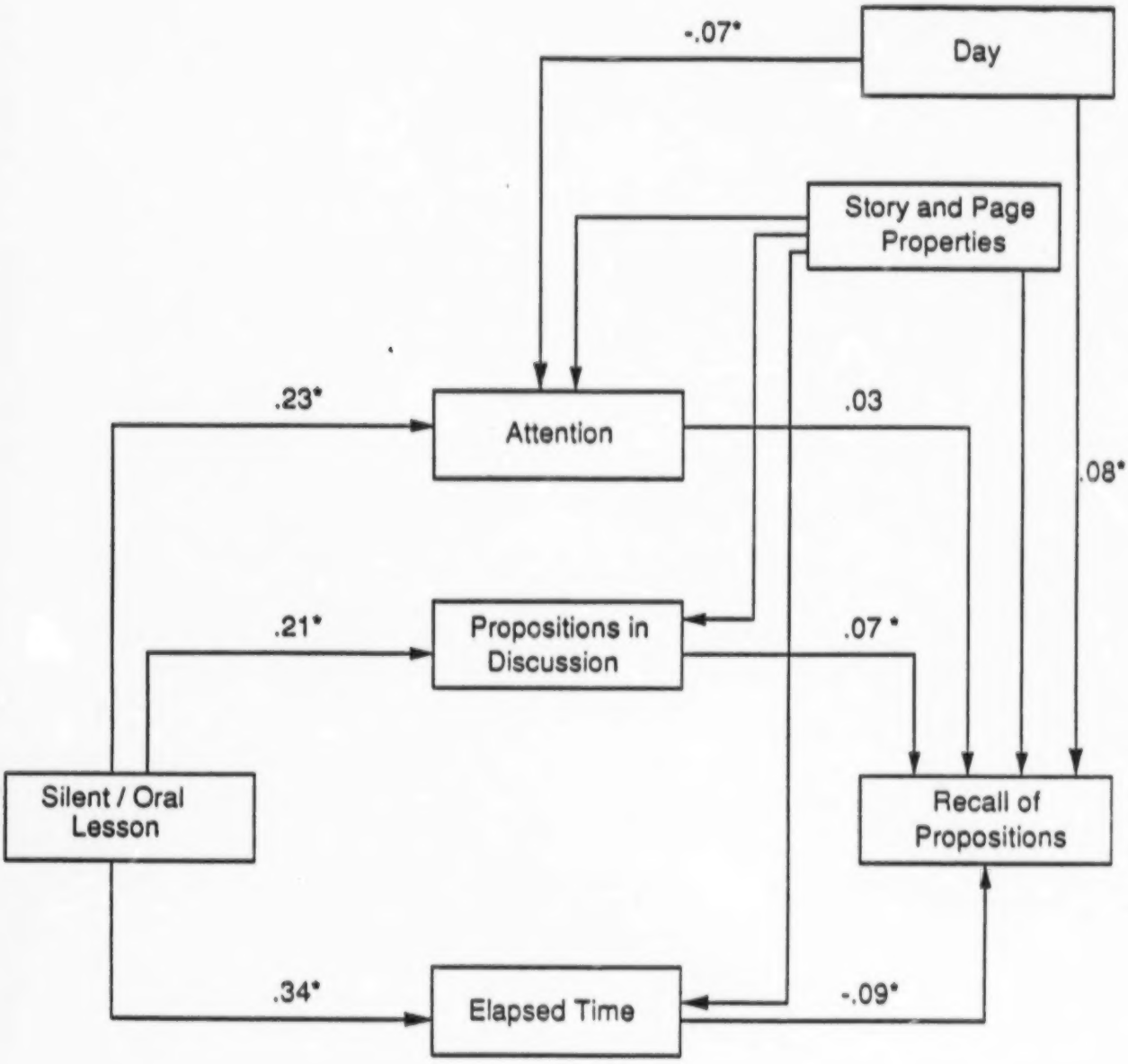


Figure 3

Path Analysis of Relations Among Type of Lesson, Group Processes, and Recall of Propositions on Page (*p < .01)

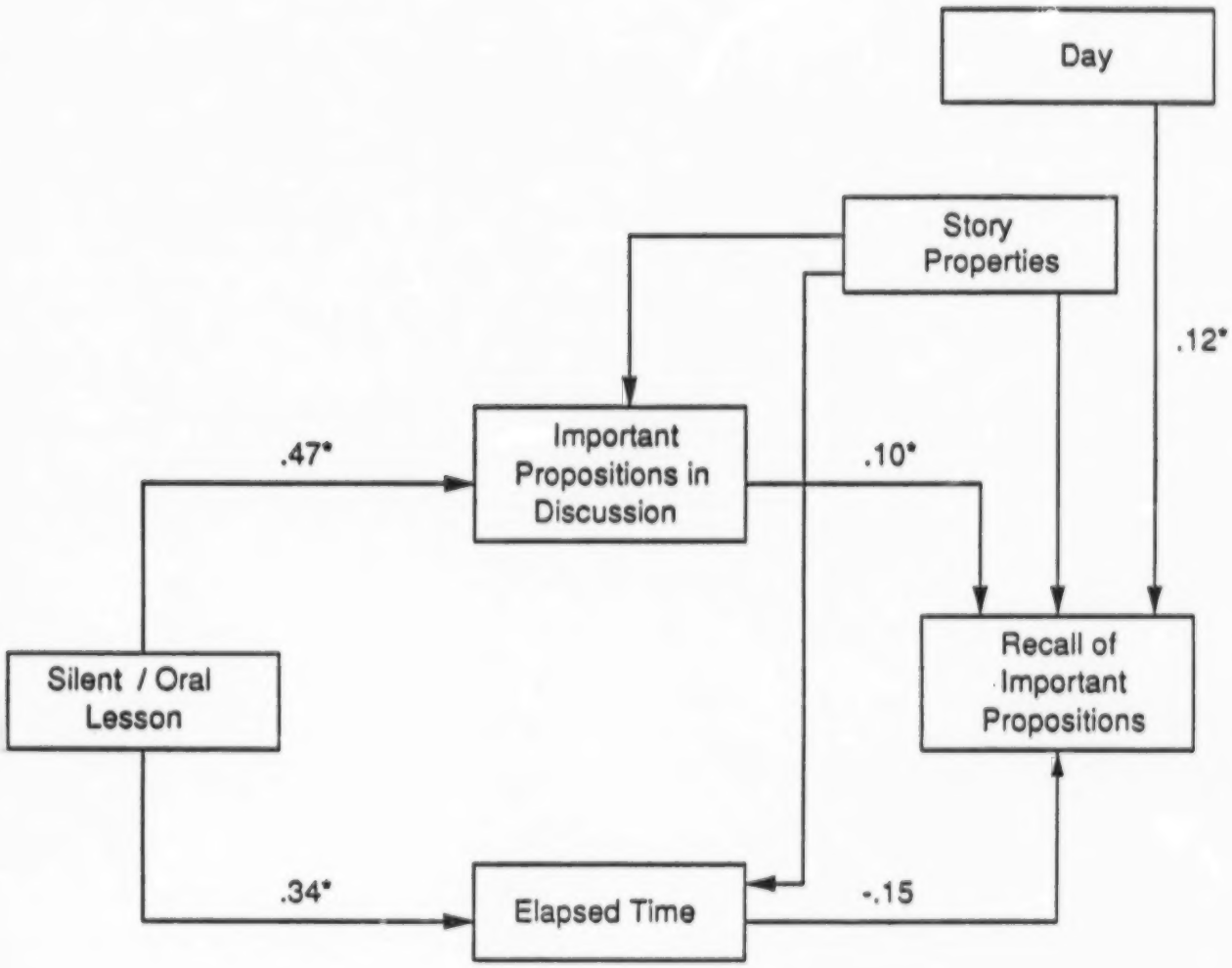


Figure 4

Path Analysis of Relations Among Type of Lesson, Group Processes, and Recall of Important Propositions in Story (*p < .01)

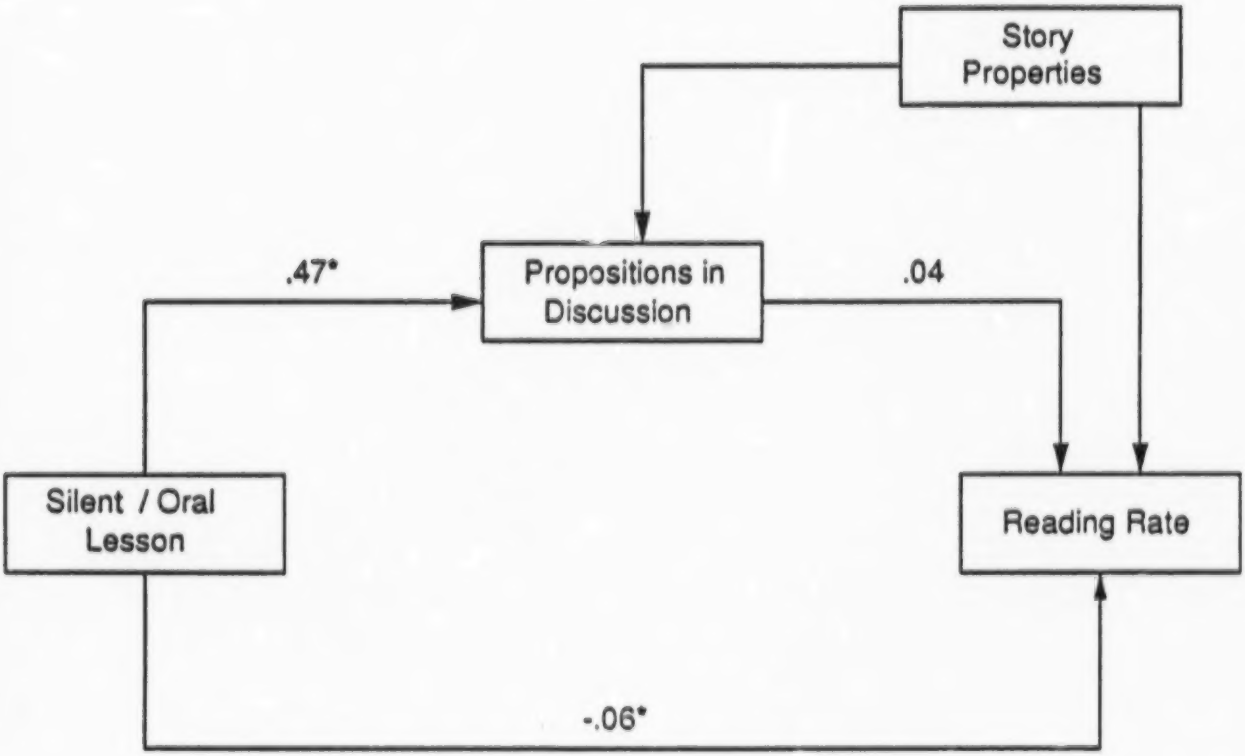


Figure 5

Path Analysis of Relations Among Type of Lesson, Group Processes, and Passage Reading Rate (*p < .01)

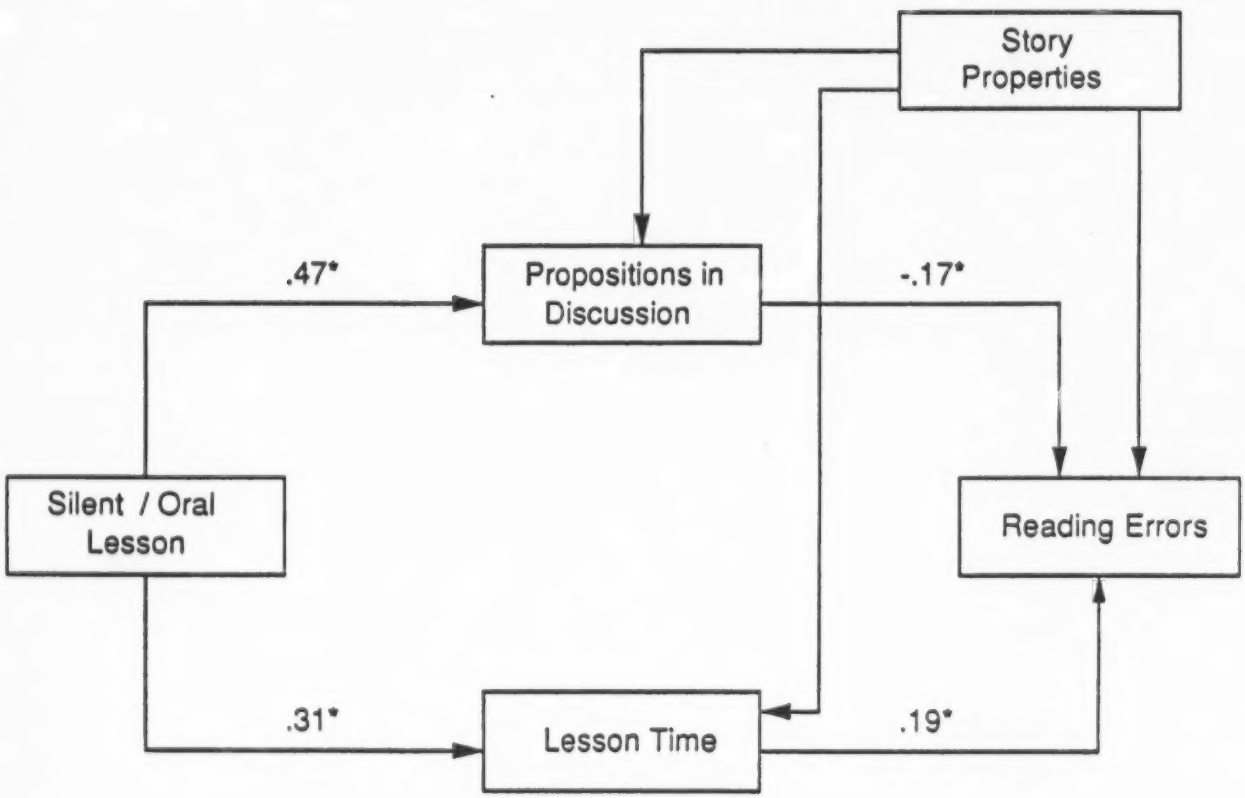


Figure 6

Path Analysis of Relations Among Type of Lesson, Group Processes, and Passage Reading Errors (*p < .01)

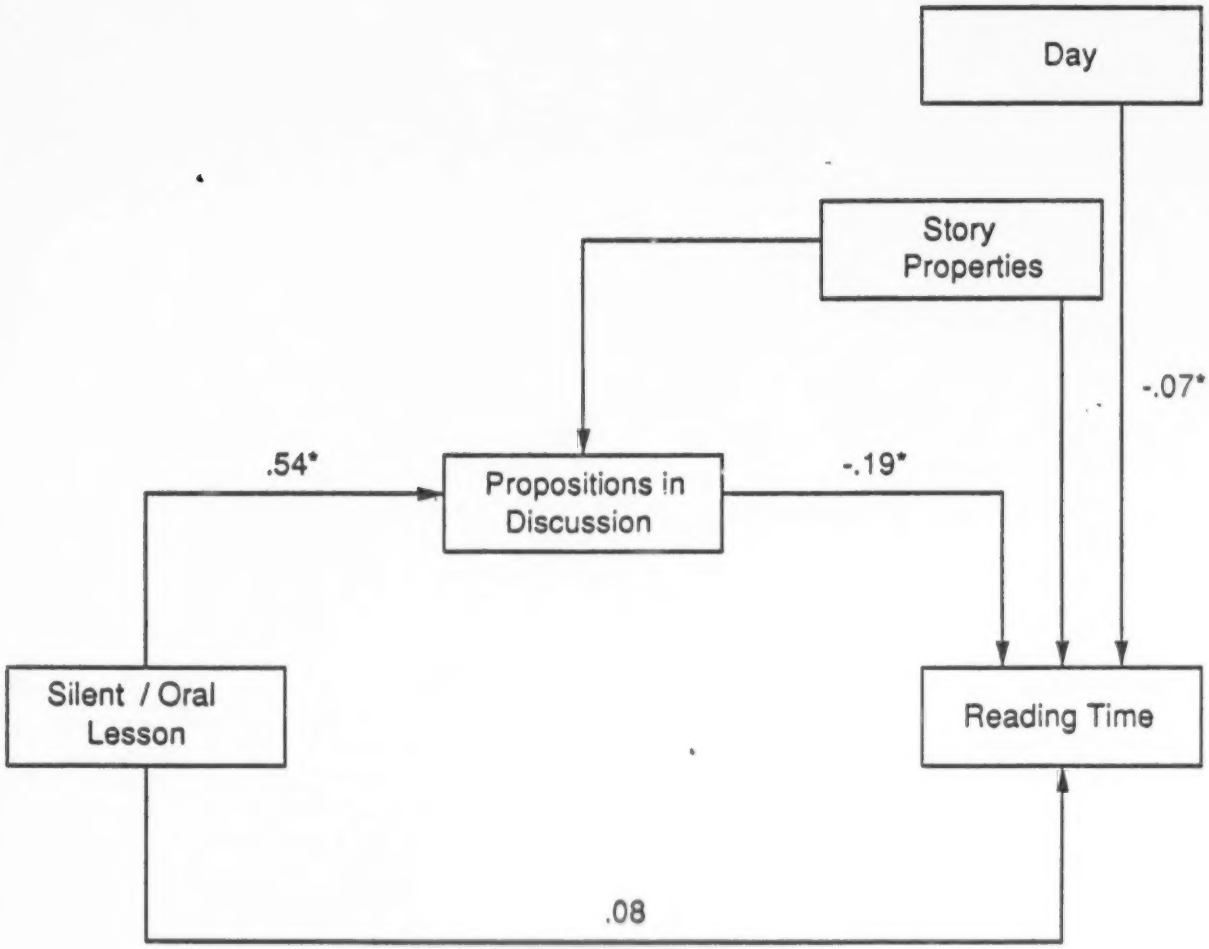


Figure 7

Path Analysis of Relations Among Type of Lesson, Group Processes, and Word Reading Time (*p < .01)